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THE  
OPHTHALMIC REVIEW,  
A  
MONTHLY RECORD  
OF  
OPHTHALMIC SCIENCE.

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EDITED BY  
KARL GROSSMANN, M.D.,    PRIESTLEY SMITH,  
LIVERPOOL,                      AND                      BIRMINGHAM,  
JOHN B. STORY,  
DUBLIN,

*With the assistance of Co-operators at home and abroad.*

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*Original contributions are marked with an asterisk (\*).*

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## REFLEX AMBLYOPIA AND THROMBOSIS OF THE RETINAL ARTERY.

BY PRIESTLEY SMITH,

OPHTHALMIC SURGEON TO THE QUEEN'S HOSPITAL, BIRMINGHAM,  
AND CONSULTING OPHTHALMIC SURGEON TO THE BIRMINGHAM  
SKIN AND LOCK HOSPITAL, AND TO THE KIDDERMINSTER  
INFIRMARY.

Attention has lately been directed, by several writers, to the important but somewhat obscure subject of loss of vision in connection with disease of the sexual organs. The case which stands first in the present paper illustrates such a connection in an indisputable manner, and throws some light, I think, upon the pathology of some at least of the cases which belong to this group. The patient's one eye became suddenly and permanently blind during a fainting attack induced by a painful disorder of the pelvic organs. The pathological sequence was, I believe, reflex disturbance of the circulation in the brain and retina, through cardiac inhibition; great reduction and slowing of the blood stream in the retinal artery; thrombosis; the event being strongly favoured by constitutional anæmia and feebleness of heart. The other eye ran great danger of a similar disaster; it was many times temporarily blinded by the same reflex mechanism, and presented, for some weeks, a marked contraction of the visual field, such as is found in cases of hysterical amblyopia. It was finally restored, apparently to a healthy state, by surgical treatment of the original centre of the disorder, namely, by the removal, by abdominal section, of both ovaries and fallopian tubes.

To this I propose to add notes of several other cases which bear upon the question of diagnosis between

embolism of the retinal artery and thrombosis of the same vessel from extraocular causes. Thrombosis of this kind seems to be a less uncommon event than the literature of the subject would lead us to suppose. It is, I am inclined to think, the actual cause of some of those disasters which we are accustomed to attribute to embolism.

CASE I.—Mrs. W., aged 24, consulted me on *Aug. 17, 1883*, on account of blindness of her left eye. The *history* which I obtained was as follows:—She had had a miscarriage about two years before, and since then had suffered much from pelvic pain. She had been ordered to use a vaginal injection twice daily, and had done so for some months past. About two months ago she had, while using the syringe as usual, caused herself intense pain and fainted; when she recovered consciousness she found that the left eye was quite blind; it had remained quite blind until about a week before her visit to me, when it seemed to recover a faint perception of light. She could not say whether the right eye was at all affected at the time when the left went blind, but since that time it had, on three separate occasions, suffered a total but temporary loss of sight; this had occurred on each occasion in connection with the use of the vaginal syringe; there was, she thought, an especially tender part which the syringe sometimes touched, and this, when it happened, always made her feel faint and ill and seemed to affect her sight. On the three occasions referred to she was in total darkness for a considerable time, probably from half an hour to an hour, and longer each time than the time before; the sight seemed to her to return from one side.

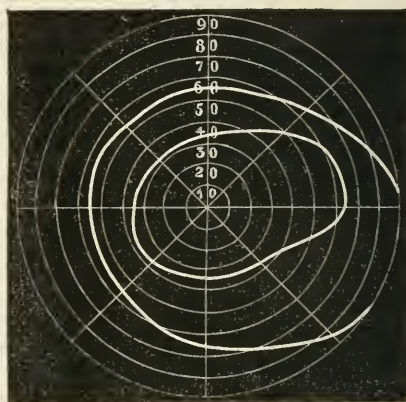
*Aug. 17, 1883.*—Patient is thin, pale, and delicate-looking; very anæmic. *Right eye*: Hm.  $\frac{1}{24}$ ; V  $\frac{1}{20}$ ; accommodative asthenopia on reading; external appearances normal; pupil active; media clear; fundus normal, the disc being of good colour and the retinal vessels of normal size; field of vision, mapped with perimeter, entire (see figure). *Left eye*: V nearly O, but a faint perception of light in a very small area near to the centre of the retina; pupil same size as its fellow, irresponsive to direct light, but active consensually; media clear; disc white, well-defined; no change at yellow spot, or possibly a slight pigment

disturbance; retinal arteries shrunken to threads and for the most part empty, in the lower half of retina recognisable only as very fine white lines, in the upper half also very fine but apparently containing a little blood; retinal veins, a little larger than the arteries.

Believing that the condition of the left retina was due to thrombosis of the retinal artery occurring during a period of sudden cerebral and retinal anæmia, induced by the use of the syringe, and that, at each repetition of the faintness and loss of sight, the right retina was in imminent danger of a similar disaster, I bade the patient at once discontinue the use of the syringe, however desirable it might be on other grounds, and urged her to forthwith consult a competent adviser as to the treatment of the pelvic troubles. In spite of this injunction, given most urgently to a responsible relative of the patient who accompanied her, she was allowed at once to return to her home, fifty miles from Birmingham, and no further medical advice was obtained for some time. Nearly two months later (Oct. 23) she came to see me again, having meantime spent a month at Scarborough, with benefit to her general health. She had also, while temporarily in Burton-on-Trent, consulted Mr. George Lowe of that town, who kindly sent me a report of her then condition, from which I extract the following:—"She was thin, pale, anæmic, with cardiac murmurs extending along the large vessels. I learned that she had suffered much from dysmennorrhœa, and had had severe pain in the direction of the left ovary, and had been told there had been inflammation of that ovary. I examined her very carefully, and failed to detect any evidence of disease in the heart, the chest (the cardiac murmurs being attributable to the state of blood), the liver, or bowels. There was pain on pressure over the left ovary. There was no uterine condition at the time to account for the debility, and there was no renal disorder: the urine was free from sugar and albumen, and was otherwise healthy."

*Oct. 23.*—Improved in general appearance, but still very anæmic. *Right Eye:* Hm.  $\frac{1}{24}$ ; V  $\frac{1}{20}$ , as before; "sight very weak." She has glasses which correct the Hm., but even with these the eye fails at once if she tries to read, becoming red and watery; field of vision contracted at all parts of the periphery

(see figure). *Left Eye:* As before. Several short attacks of complete loss of sight since last visit, apparently brought on by exertion and fatigue; on one occasion she suddenly went blind and giddy while walking in the street, and, to prevent falling, seized hold of a gentleman who was passing; she was led into a shop, and after she had sat there a while the sight came back. This morning she hurried to catch the train, and on entering the carriage fainted, and did not recover her sight for some time.



FIELD OF VISION OF RIGHT EYE.—At the first examination it was normal, as shewn by the outer line. At the two following examinations it was contracted, as shown by the inner line. The day before the operation it was much contracted, but no chart was taken. At a final examination, thirty-two days after the removal of the ovaries, it had nearly recovered its normal dimensions.

It was now arranged that the patient should remain in Birmingham for further examination, and treatment if necessary, directed to the pelvic organs. Dr. Ed. Malins saw her with me the following day. After thorough examination he diagnosed chronic ovaritis, with dilatation of the fallopian tube of the left side, and pronounced the opinion that the removal of the diseased organs by abdominal section afforded the only means of permanently curing the pelvic troubles and restoring the health.

The question was raised whether the shock of the operation might not itself induce immediate loss of the remaining sight

of the right eye. To this it was not possible to give a reply based upon actual experience. It was clear that the eye was in danger of becoming permanently blind in any one of the attacks to which the patient was so liable, and that unless the pelvic disease and resulting anæmia could be cured this danger would continue. There was reason to believe that the inhalation of ether during the operation would ward off the tendency towards reflex disturbance of the cerebral and retinal circulation, which appeared to constitute the immediate danger to sight. From the ophthalmic standpoint, therefore, it appeared right to urge the carrying out of any measure which was essential to the removal of the pelvic disorder.

About a fortnight later the patient was admitted into the General Hospital under the care of Dr. Malins, and on *November 20th* underwent operation at his hands. In the interval I examined the *right eye* once more with the perimeter and found the field contracted to about the same extent as on *October 23rd* (see figure). During the few days preceeding the operation the sight became, according to the patient's account, still more defective, being, as she expressed it, "very much shut in at the sides." On the very day before the operation there was an unusually prolonged attack of total darkness. An aperient had been given to empty the bowel previous to operation; the act of defæcating caused severe pain, she fainted, and afterwards remained quite dark for at least two hours—according to the nurse, a good deal longer than this; sight returned gradually during the day. I made a bedside examination of the eyes a few hours after the sight had returned, but found no distinct change; the veins of the *right* retina seemed rather fuller in proportion to the arteries than on former examinations; the field was contracted, but whether more so than at the last examination I could not determine.

*Operation, Nov. 21.*—Abdominal section; removal of both ovaries and both fallopian tubes. "Left ovary matted to left side of pelvis, the corresponding tube convoluted and distended with clear fluid; right ovary and tube intimately adherent, so that their normal relations were destroyed, the tube being contracted and containing clear fluid."—E. Malins.

*Dec. 2.*—(Twelve days after the operation) Dr. Malins wrote me: "You will be pleased, I am sure, to know that Mrs. W——



is doing remarkably well ; a few days ago she told me that she could see better than she had done for six months, and that she had read a letter from her husband, which was more than she had been able to do for a long time."

*Dec. 23.*—Examination made at General Hospital:—  
*Right eye:* Acuity of central vision probably about as before. Asthenopia much diminished ; she can now read without difficulty. Field of vision, mapped with perimeter, entire, except perhaps at the periphery on the outer side where the limit lies at about  $85^{\circ}$  instead of at  $90^{\circ}$  or beyond it ; this is a very marked improvement. Disc is, I think, pinker than it was before admission to the Hospital ; it is now of good colour ; the arteries, perhaps, rather small still. *Left eye:* Probably slightly improved as regards the small central sentient area, for she says that she sometimes sees double now ; otherwise as before.

In connection with the first action of the bowels after the operation there appears to have been acute pain in the pelvis, with some faintness and obscuration of sight ; with this exception the sight has, in the patient's opinion, steadily improved since the operation. She leaves the Hospital, convalescent, to-morrow.

If it were necessary, at the present day, to insist on the mutual dependence of distinct branches of medical practice, however specialised they may have become, one might well point to the foregoing case. The ophthalmic examination directed attention to the disease of the pelvic organs ; the diagnostic and surgical skill of the gynecologist was, in all probability, the means of preventing blindness. The ophthalmic aspect of the case can alone be discussed here.

It is clear that the loss of sight depended more or less directly upon reflex influence. The attacks of transient blindness which the right eye suffered may have been the expression of heart failure merely, or they may have been due to spasm of blood-vessels, but in either case they were directly induced by reflex mechanism set in motion from the pelvis. Several

attacks were excited by the use of the vaginal syringe; a very severe one occurred in connection with the painful passing of a fæcal mass shortly before the operation, and another arose at the first action of the bowels after the operation, when, though the diseased ovaries and tubes were gone, the surrounding structures would no doubt be highly sensitive.

Very gentle stimulation of an inflamed peritoneal surface produces marked inhibition of the heart's action, and in general the alimentary tract seems in closer connection with the cardio-inhibitory centre than other parts of the body, but, apparently, stimuli, if sufficiently powerful, will produce reflex inhibition from whatever part of the body they come. Fainting from emotion, or from severe pain, is the result of a reflex inhibition of the heart (Michael Foster, Textbook of Physiology, 3rd ed., p. 174). Heart failure was probably the chief factor in the present case, for in most of the attacks, though not in all, the loss of sight was accompanied by actual fainting; but in other cases we find similar attacks of transient blindness with little or no sign of general failure of cerebral circulation, hence the probability of such attacks being due in some cases to a localised spasm of blood-vessels in the brain or retina cannot be omitted from consideration.

Which portion of the visual apparatus was at fault during these transient attacks? In many cases of the kind we can get no direct evidence on this point, though, as Gowers points out, it is unlikely that the loss of sight depends upon anæmia of the perceptive centres when the other functions of the brain are undisturbed, or when the blindness lasts long after faintness has disappeared (Medical Ophthalmoscopy, 2nd ed., p. 123). In the present case the condition of the left eye showed that *its* blindness, at least, was caused by retinal and not by cerebral anæmia, and seeing that the exciting cause and mode of onset were the same in both cases, it can hardly be doubted that the frequent transient

blindness of the right eye was also a retinal, and not a cerebral, condition.

The ophthalmoscopic appearances in the blind eye, examined two months after the sight was lost, were precisely like those which follow embolism of the retinal artery. In a case to be recorded further on the eye was examined on the fourth day of the blindness, and here again the appearances were identical with those of recent embolism. In both, however, a diagnosis of thrombosis may, I think, be made, and the idea of embolism rejected, with confidence. Given the ophthalmoscopic signs of arrest of the blood-stream in the retinal artery, the points in the history which favour the diagnosis of spontaneous thrombosis, as distinguished from that which is set up by an embolus carried thither from a distance, appear to me to be these:—

(a) Previous attacks of transient blindness in the blind eye.

(b) A simultaneous attack of transient blindness in the fellow eye.

(c) Previous or subsequent attacks of transient blindness in the fellow eye, especially if the conditions of the onset were the same in the permanent as in the transient attacks.

(d) Signs of disturbance of the cerebral circulation at the onset of the blindness, giddiness, faintness, headache.

The condition of the heart and arteries probably gives no very decided evidence either way; valvular lesions and atheromatous changes supply a likely source for emboli, but, on the other hand, such changes, by reducing the propulsive power of the heart and the easy flow of the blood, may act as auxiliary causes of thrombosis.

Evidence strongly in favour of embolism is probably chiefly of a negative kind:—

(a) Absence of transient attacks of blindness either in the blind or in the fellow eye.

(b) Absence of giddiness, faintness, or pain at the moment of onset.

If the foregoing distinctions be real, then, in my own experience, spontaneous thrombosis of the retinal artery occurs about as frequently as embolism. Among eight cases of sudden blindness of one eye, with partial or complete obliteration of the retinal artery, which I have examined, and of which I have notes, I find four in which embolism was probably the cause, and four in which thrombosis affords a more satisfactory explanation.

In opposition, to some extent, to the opinions here expressed, I must quote no less an authority than that of Leber (Graefe-Sæmisch, vol. v.). He says (p. 581) "spontaneous thrombosis of the retinal vessels has hitherto come little under direct observation, but it probably plays an important part in many inflammatory conditions of the retina and optic nerve." Of spontaneous thrombosis arising from general disturbance of the circulation I can find no mention. Again (p. 546), "It happens in rare instances that after embolism of the retinal artery in the one eye, the other is attacked in the same manner, or suffers from transient blindness." And again (p. 541), "The permanent blindness of embolism is sometimes preceded by one or more attacks of transient dimness of vision or blindness, lasting sometimes a few minutes, sometimes several hours." For the last-mentioned phenomenon the explanation which has been suggested is that an embolus in the ophthalmic artery becomes temporarily arrested at the point where the retinal artery leaves it, and a little later is carried on by the main stream to less important parts so as to again set free the current to the retinal artery. This is an admissible hypothesis for the case of a single transient attack, but becomes improbable where a transient leads up to a permanent attack, and fails entirely where we have a history of a series of transient attacks. It is not impossible to conceive of an obstructing body acting in an intermittent valvular

manner and thus causing intermittent blindness; but the idea is opposed to all experience of the action of obstructions subject to pressure in one direction only, and cannot be accepted as a reasonable explanation. No explanation has been suggested for obscurations in the second eye following embolism in the first.

If it be admitted that a sudden diminution in the amount of blood in the retinal artery, together with slowing of its movement, may sometimes suffice to cause thrombosis and obliteration, complete or incomplete, of its lumen, then the connection between transient and permanent blindness in these cases is readily intelligible. It seems likely that the almost complete absence of collateral circulation in the retina, the sharp bends which the vessels make in passing from the nerve-trunk into the retina, and the resistance offered by the vitreous pressure, may all give the retinal artery a somewhat exceptional liability to such an accident. It is probably owing to these peculiarities of position that in such cases as the one related above the loss of vision is always of longer duration than the fainting fit itself. Galezowski has recorded several cases of "ophthalmic migraine," in which, after many transient obscurations of vision, one eye became permanently blind, with the ophthalmoscopic signs of arrested circulation in the retina; he ascribes the accident to spontaneous thrombosis during spasmodic contraction of the vessels (*vide* O. R., vol. I., p. 190).

(To be continued.)

H. WILBRAND (Hamburg). Neurasthenic Asthenopia. *Archives of Ophthalmology*, XII., p. 429, Sept.—Dec., 1883.

In an article covering more than fifty pages, Wilbrand discusses the important and frequently perplexing symptoms of visual disturbance which arise in connection with functional disorders of the nervous system. The most characteristic of these symptoms is the peculiar impairment of vision described by Leber and others (Graefe-Saemisch Handbuch, V., p. 980, etc.) under the name Retinal Anæsthesia. This name is an

unfortunate one, for it by no means covers the whole ground ; signs of hyperæsthesia of the retina are in many of the cases in question no less marked than those of anæsthesia. Neurasthenic Asthenopia, the name proposed by Beard, is adopted by the author as more correct ; it includes, of course, other disturbances of the visual apparatus besides the so-called retinal anæsthesia.

Neurasthenic asthenopia is not an independent local disorder of the eye, or of any portion of the visual apparatus ; it is a local manifestation of a general disorder of the nervous system, the essential characteristics of which are *increased excitability* and consequent tendency to *rapid fatigue*. The whole of the morbid nervous phenomena which we meet with in cases of this kind may be referred to these two conditions.

*Increased Excitability.*—Such patients are usually easily irritated, excitable, or passionate. They sleep badly ; if they fall asleep easily they waken soon, and get no more sleep during the remainder of the night ; more often the falling asleep is delayed for hours by the hosts of thoughts and fancies which continue to occupy the mind ; sleep, when it comes, is often disturbed by dreams. They are liable to disturbances of hearing, taste, and smell ; they complain of humming and ringing in the ears, have hallucinations of hearing, fancying that they hear children crying or their own names uttered when no such sounds exist ; are extremely sensitive to loud talking, and to noise of all kinds ; perceive tastes and odours with excessive acuteness, and suffer occasionally from subjective sensations of smell independently of external causes. In the region of general sensation, they are liable to many disturbances, such as pain in various parts, formication, itching and burning of the skin, feelings of alternate heat and cold. In the motor apparatus a tendency to over-action is manifested by their restlessness, their frequent change of position, and sometimes by the rapid alternation with which they “fix” first the one eye and then the other of the person with whom they are conversing. Secretory disturbances also are common in these persons, such as increased and abnormal secretion of perspiration and of urine, and frequent seminal emissions ; one case is mentioned by Wilbrand in which a maiden lady, aged forty-five, complained that her left breast, without any notice-



able alteration in its condition, had for years occasionally secreted large quantities of milk.

Together with these signs of excitability in the nervous system as a whole, others are met with which belong specially to the visual apparatus. In a few cases hallucinations of vision occur; persons and things which have no existence are seen by the patients, and sometimes excite great terror. More frequently objects take on bright, unreal colours. The most constant visual symptom of this class, however, is the dazzling which is caused by even a moderately bright light, such exposure being at once followed in many persons by headache and pain in the temples and eyes. Some of these persons show a great aversion to any forcible contrast of light and shade, a marked instance of which was observed by Wilbrand in the case of a highly neurasthenic gentleman who could not converse with any one wearing clothes of a pronounced check pattern without suffering severely from headache and malaise as the result. Others show a well-marked *chromatophobia*, or aversion to certain colours. Again, the eyes show an insuperable tendency to redden, and to run with tears upon quite trivial stimulation, whether from mental excitement or from exposure to light, heat, cold, or wind. The pupils, though often large, are extremely active. A tendency to excess of reflex action is seen also in the accommodative spasm which arises during efforts at near vision, and in the blepharospasm, which is very frequent in these cases, and which sometimes passes on to spasm of other muscles of the face and even of the limbs. One of Wilbrand's patients, a man, after he had exerted his eyes a short time in a perimetric examination, was seized with clonic blepharospasm, which extended to all the facial muscles, and ended in general convulsions.

*Fatigue.*—The hyperæsthesia of the nervous system, which finds expression in the foregoing group of symptoms, is accompanied, as a necessary consequence, by extreme liability to exhaustion of nervous energy, and this manifests itself in a group of symptoms of an opposite type. A lack of mental energy and perseverance, absent-mindedness, forgetfulness, weariness, and depression of spirits, are among the most constant signs of neurasthenia. Impairments of smell, taste, and hearing are occasionally complained of. In the nerves of

ordinary sensation the exhaustion declares itself by feelings of numbness in various parts ; in the motor system by general lassitude, indolent carriage of the body, and actual paresis of different groups of muscles.

In the visual apparatus the signs of nerve exhaustion are remarkable and characteristic ; they are of several kinds :—

(a.) *The Field of Vision is Contracted.*—In a series of cases of neurasthenic asthenopia, twenty-four of which are related in detail and illustrated by perimeter charts in the article before us, Wilbrand mapped the field in the following manner :—

Using Förster's perimeter, and beginning with the horizontal meridian, he moved the test object across the entire field in each successive meridian, entering the field at the one side and passing out of it at the other. This rather tedious process was found to entail considerable exhaustion of the sensibility of the retina, as shown by the fact that in each meridian the defect was greater at the point where the sight object left the field than where it entered it, and that it was also greater in each succeeding meridian than in the one before. A peculiar chart was thus obtained, in which the principal defects lay in the inner half of the field. Then, the patient having been allowed fifteen minutes' rest, the process was repeated with the same eye and in precisely the same manner, except that each meridian was now travelled over in the opposite direction, *i.e.*, entering the field from the inner side, and passing out of it at the outer side. A second chart was thus obtained, which proved in nearly every case to be an almost complete counterpart of the first, the defects being similar in kind and in degree to those in the first chart, but situated in the outer half of the field instead of in the inner.

The peculiarly shaped charts obtained in this manner are not to be taken as true pictures of the visual field at any given moment ; they represent rather the progressive exhaustion of retinal sensibility which is induced by a prolonged effort on the part of the eye. If the second chart be inscribed over the first, the more perfect half of the one lies upon the more defective half of the other ; the field of the unexhausted retina is then represented approximately by the whole of the outer limit of this compound chart, while the field of the same retina after exhaustion by a prolonged effort

is represented by the whole of the inner limit. The meridians in Wilbrand's charts are twenty degrees apart, and they were taken in all cases in the following order: first the horizontal, then the four above the horizontal, and then the four below the horizontal. The charts obtained are, of course, only true for this particular mode of testing; a different sequence of meridians would transpose the effects of exhaustion to other parts of the field.

With regard to the degree of contraction present at the beginning of the examination, Wilbrand distinguishes two groups of cases; in the first the meridians first tested show little or no initial defect, or may even show an extension outside the normal limit; in the second there is, even at the outset, a considerable defect in all meridians. In the majority of cases, provided the eye has had a period of rest, the field must, he thinks, be considered as normal in extent; it is apparently the effort of attention which brings on the increasing contraction discovered by the perimeter. It is only on this supposition that it is possible to explain the paradoxical phenomenon of patients with extremely contracted fields in both eyes being able to walk about with total lack of hesitation or uncertainty.

(b.) *Objects disappear from view too rapidly.*—In the contraction of the field we see a failure in the conduction and perception of the peripheral impressions of the retina; a similar failure is observable with regard to its central impressions. If the normal eye gazes too long and too fixedly at any given object, the latter, after a while, disappears from view; in neurasthenia this happens much sooner than in health. The word or other object upon which the patient fixes his attention suddenly grows misty and disappears; during examinations with the perimeter the fixation object often vanishes for a while and then reappears; here again we have the evidence of an exhaustion which lies on the borderland between health and disease.

(c.) *The Acuity of Central Vision is Diminished.*—The degree of such impairment is usually slight, but it shows great fluctuations; commonly, vision is about  $\frac{3}{8}$ , falling during sustained effort to  $\frac{2}{8}$  or  $\frac{2}{7}$ , or lower. There is often evidence to show that when these patients are compelled, or strive, to

see, their acuity is decidedly less than it is under ordinary circumstances.

(d.) *Sudden Attacks of Amblyopia and Scotomata*.—These attacks are likened to a veil falling over the eyes, or to a fog or smoke suddenly filling the room; sometimes the fixation point remains clear, while all the surrounding objects are veiled. They usually last a few minutes only, but may persist for several days. They have been explained by Mooren on the hypothesis of a vasomotor disturbance, causing a temporary œdema in the course of the optic fibres towards the cortex. As an objective sign of retinal disorder it is to be noted that in very many cases there is more or less hyperæmia of the optic disc.

(e.) *Loss of Memory for Optical Impressions*.—Neurasthenic persons are forgetful of their visual impressions as of other impressions. One will pass without recognition a person with whom he has only a few minutes before been conversing; another can retain no mental pictures of houses, streets, or other objects which he has seen.

(f.) *Muscular Asthenopia*.—The ocular muscles rapidly tire; the inner recti particularly show an inability for prolonged fixation; the ciliary muscles manifest a tendency to relaxation alternating with spasm, causing subjective impressions of micropsia and macropsia, and false ideas of distance. Diplopia and transient ptosis arise from similar causes.

*Differential Diagnosis*.—The diseases with which neurasthenic asthenopia may occasionally be confounded are atrophy of the optic nerve, glaucoma, and perhaps sympathetic ophthalmitis (sympathetic irritation?). Its distinguishing characters are the following:—A paradoxical want of agreement between the vision and size of field obtainable by examination, and the unembarrassed locomotion of the patient: An equal degree of impairment from glaucoma, or nerve-atrophy, causes a far greater disablement to the patient than is manifested in typical cases of neurasthenic asthenopia. Great variations in the size of the field at different examinations. Activity of the pupil: This is more often exaggerated than diminished. The presence of patellar-reflex: This is never lost in simple neurasthenia. An absence of coloured halos round a flame, such as are seen in incipient glaucoma. The alternating and apparently vicarious

nature of many of the patient's symptoms: The most urgent ocular troubles sometimes disappear quite suddenly, giving place to nerve disturbances in other regions. Transient observations of vision are, however, not confined to cases of simple neurasthenia; they are not unknown, as Wilbrand points out, in the optic atrophy of tabes; here they are probably the result of a functional exhaustion which travels in advance of the actual atrophic degeneration.

The *etiological causes* of neurasthenic asthenopia appear to be in some cases congenital, in others, acquired. It is very frequently associated with anæmia and chlorosis, and is connected, in many cases, with ovarian irritation, or with congestion, and displacement of the uterus. It cannot, however, be always referred to such conditions, for it occurs in males, and independently of any genital disturbance. It may arise from any shock to the nervous system. It may follow concussion of the brain.

The prognosis need seldom be unfavourable, for the asthenopic symptoms appear seldom to pass on to serious structural changes; they are, however, in some cases, the forerunner of serious nervous diseases. In all cases the disease is an eminently chronic one, and apt to relapse under the influence of slight causes.

*Treatment.*—When the asthenopia can be referred to a curable local disorder, such as a uterine displacement, treatment will be of more avail than when it depends upon congenital neurotic tendencies. Over-work, both bodily and mental, and all over-exciting or depressing influences, must be avoided. Blood-letting is distinctly contra-indicated; sexual excitement is to be avoided; fresh air and exercise are important, but the latter must always stop short of fatigue. Bromide of potassium, iron, strychnia, quinine, castoreum, and valerian are the most useful drugs. Cold douches and faradisation of the surface are often useful; nitrite of amyl has been known to temporarily relieve the visual symptoms, the moderate use of wine does so in many cases. Refractive errors must be carefully corrected, but it is just in these cases that attention to the refraction only will lead to disappointment; the glasses ordered are frequently the source of fresh complaints; the reflection from their surfaces causes painful dazzling, and the pressure of the frame

produces intolerable sensations in the nose and temples. Blue or gray glasses often give much relief, and frames of tortoise-shell are sometimes tolerated better than steel. A frequent change of remedies, and a persistent encouragement of the patient to look hopefully to the future, are essential elements of the treatment.

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TH. LEBER (GÖTTINGEN). Xerosis Conjunctivæ and Infantile Corneal Ulceration. *Von Graefe's Archiv.*, XXIX., III., p. 225.

Leber distinguishes between Xerosis attacking a previously healthy conjunctiva, which forms the subject of this paper, and Xerophthalmia due to the dryness of the surface produced by cicatricial contraction of the mucous membrane. The former (xerosis proper) he places among parasitic diseases, therein corroborating the conclusions arrived at by Kuschbert and Neisser in their investigations into the form of xerosis that accompanies nyctalopia.

The first case dealt with in the paper is one of that form of xerosis with corneal ulceration which occurs in young infants, and terminates almost invariably in the loss of the eye and the death of the child.

This disease was first described by von Graefe in 1866, under the title of "Corneal Ulceration in Infantile Encephalitis," and, though not infrequent in Germany, is a disease that seems not to have been hitherto observed in this country. Soelberg Wells in his treatise merely mentions the fact that von Graefe had described it, and no other English writer that the author of this abstract has consulted even alludes to the affection. Von Graefe was inclined to assign the corneal ulceration to a neuromyolytic origin, but the observations of Jastrowitz subsequently refuted this view by demonstrating the non-existence of the encephalitis upon which it was based. Jastrowitz found that the redness of the white cerebral substance and the occurrence in it of abundant fatty granules, which von Graefe had accepted as evidences of inflammation, were normal conditions in the infant's brain.

Bezold in 1874 was the first to demonstrate the presence of a parasitic growth in xerosis conjunctivæ, and Horner some three years later found mycotic infiltration in the floor of a



corneal ulcer which occurred in the eye of a child affected with hereditary syphilis. Both Bezold and Horner account for the disease observed by them by assuming that defective nutrition and undue exposure of the cornea, the result of insufficient closure of the lids, render the epithelium a suitable nidus for the growth of the micro-organisms. Leber's first case, however, disproves this theory so far as the micro-organisms of xerosis are concerned. It is that of a four-months-old child, brought up by hand, who had been observed to have some conjunctival discharge, and to be keeping its eyelids constantly closed. It had previously been perfectly healthy, but from this time began to suffer from constipation and anorexia. After four weeks of this condition, its corneæ were discovered to be extensively ulcerated, and it was brought to Leber's clinique. Its eyelids were at that time swollen, and the ocular conjunctiva was dull and dry, and crumpled up into folds with every movement of the globe. There was a mucopurulent discharge, but the essential feature of the case was a thin white material somewhat like congealed fat, which covered the conjunctivæ, and was especially well-developed at the two sides of the cornea. The right cornea was almost entirely destroyed, and the iris almost completely prolapsed. Two-thirds of the left cornea was occupied by a large perforating ulcer, with considerable protrusion of the iris. The sensibility of the eyes was greatly diminished. The child was apparently healthy in every respect exclusive of the ocular trouble and general malnutrition.

The discharge and the white layer covering the conjunctiva consisted of epithelial cells covered with dense parasitic growths. No free fat was present. The parasitic growths were of two principal shapes, (a) *micrococci* of considerable diameter, which stained more deeply when treated with gentian-violet than (b) *bacilli*, of somewhat lesser diameter than the preceding, which when grouped in pairs formed long rod-like bodies. Colonies of these bodies were found in the cornea also. The dry preparations were stained equally well by different aniline colours—gentian, fuchsin, and Bismarck brown. The size of the micro-organisms was much greater than that of Neisser's cocci found in purulent ophthalmia. The diameter of the cocci varied between 0.0004 and 0.0005 mm., that of the

bacilli between 0·0003 and 0·0004 mm., and the length of the latter when grouped into pairs varied between 0·0012 and 0·0018 mm. Similar bodies were found in an exudation upon the child's gums, the micrococci collecting into masses occasionally simulating sarcinæ, and the bacilli being in places indistinguishable from the ordinary buccal leptothrix except for the absence of the violet reaction to iodine.

The case went on to panophthalmitis, with purulent hyalitis in both eyes. As this passed away ulcers formed in the palpebral conjunctiva, and the child eventually died exhausted by severe diarrhoea and vomiting, but at no time were there any convulsions or other symptoms of actual cerebral disease. There were no evidences of syphilis in child or parents.

At the post-mortem examination the brain was normal, the lungs partially hepatised, and the pleuræ covered with a thin layer of fibrin. The kidneys exhibited the most marked and interesting changes, the epithelial lining of the pelves and papillæ being much thickened, and changed into a satin-like material, in which numerous brownish-yellow concretions lay imbedded. On the surface of the kidneys there were numerous small hæmorrhages, and some whitish spots having the appearance of commencing suppuration. The ribs and some other bones exhibited changes of a rachitic nature. The conjunctivæ scleræ still showed well-marked xerosis, and the ulceration could be seen penetrating through the sclera into the interior of the globe. All the superficial epithelial cells of the conjunctiva were filled more or less fully with bright bodies, having a reflex like fat globules, and for the most part of an undoubtedly fatty nature. The deeper polygonal prickly cells presented very little of this fatty change. The micro-organisms were to be seen very clearly in osmium preparations, but remained unstained, or only accepted a very slight coloration. Leber found no evidences of the fatty envelope which Neisser has described round any of them. The micro-organisms were found also in the conjunctival ulcers, the corneæ, and between the pus corpuscles in the interior of the globe. The renal epithelium contained precisely similar bodies, their appearance being essentially limited to the pelves of the kidneys. Micrococci and bacilli were found in the small intestine, and also in the bronchial mucous membrane.

Leber's conclusion is that the conjunctivæ scleræ and the pelves of the kidneys were the seat of a hypertrophic epithelial affection of a desquamative character, caused by the growth of a peculiar fungoid organism (spaltpilz).

He considers the micrococci as merely the representatives of the bacilli in an earlier stage of development, as the two bodies were always found together, and as numerous intermediate forms were always present. Only one cultivation experiment was undertaken with the xerotic substance from the conjunctiva, but many successful cultivations were made of the micro-organisms found in the pelves of the kidneys.

The author believes that the micro-organisms were undoubtedly the cause of the disease, for neither paralysis of the trigeminus nor exposure of the cornea were present in this case to account for the inflammation. The brain was healthy, and the trigeminus, when microscopically examined, was normal. From a study of the published cases of this disease, Leber concludes that exposure of the cornea must be quite exceptional as a possible cause, and he finds a clenching argument against the exposure theory in the fact that this form of xerosis is microscopically identical with that which occurs in nyctalopia (Leber uses the term hemeralopia, meaning thereby night-blindness), and no one has yet come forward to assign the xerosis in this latter affection to exposure.

In a series of experiments upon the healthy eyes of rabbits severe ulcerative keratitis resulted from the application of the micro-organisms from cultivations in gelatine, and subsequent microscopical examination demonstrated precisely similar appearances to those observed in the human eye. No distinct xerosis, however, was produced in the rabbit.

The author then describes two cases of nyctalopia (night-blindness) with xerosis conjunctiva, in which he found exactly similar micro-organisms. The second case was one of those in which nyctalopia occurs as a complication of icterus, and seems to be the first case of the kind in which the presence of nyctalopic xerosis has been observed. Free fat was present in the preparation from the xerosis in these cases, which Leber is inclined to attribute principally to secretion of the Meibomian glands.

Leber details four cases of what he terms secondary xerosis, which occurs as a purely local lesion without the complications of nyctalopia or severe constitutional disturbance. In the third of these cases he made a microscopical examination, and found micro-organisms similar to those already described; but at the time he made the observation the aniline staining was not known. In the fourth case gentian-violet was used, and stained the cocci and the double bacilli.

These cases of so-called secondary xerosis form the connecting link between xerosis proper and xerophthalmia. In the latter the corneal sensibility is, as is well known, much diminished, and the lachrymal secretion often perfectly abolished, this last effect being caused according to Arlt by stoppage of the ducts of the lachrymal glands, and consecutive atrophy of the glands themselves. Leber found in these cases masses of micro-organisms in the epithelial debris which lies in the sac of the disorganised conjunctiva, and he accordingly describes xerophthalmia as a dryness of the ocular surface, produced essentially by the absence of the lachrymal and conjunctival secretions, aggravated by defective closure of the lids, and leading to the development of more or less well-marked xerosis in the stricter sense of the term as employed by him.

This valuable paper will doubtless lead to further observations upon this important subject, and perhaps eventually some light may be thrown upon the as yet perfectly inexplicable connection between xerosis conjunctivæ and nyctalopia.

## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, DECEMBER 13TH, 1883.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

REPORTED BY DAWSON WILLIAMS, M.D.

*Improved Method of Section-cutting.*—Mr. Jennings Milles said that embedding in celloidin offered the following advantages over other methods:—Thin sections can be made through the whole eye in any direction; the relations of the various structures are satisfactorily retained; the embedding

material is incorporated and mounted with the section, instead of having to be removed, as in the case of wax, paraffin, etc.

Celloidin is a preparation of gun cotton, and can be obtained in the form of hard brittle cakes or shavings from Zimmermann and Co., Chemists, Mincing Lane, London, E.C. To make a solution, a cake is broken up and dissolved, in a stoppered bottle, in equal parts of absolute alcohol and methylated ether to the consistence of thick treacle; this is practically a saturated solution, and requires about a week to make. The following are the steps employed for embedding:—

- 1.—Place the eye, immediately after excision, in Müller's fluid for about one month, changing the solution several times.

- 2.—Freeze the eye and open it, usually in an antero-posterior direction and to one side of the optic disc.

- 3.—Extract the Müller's fluid by placing the opened eye in a solution of chloral hydrate (40 grs. to 1 oz.); change the fluid every day till no colour remains.

- 4.—Transfer to methylated spirit, weakened by the addition of an equal part of water, and in a few days to ordinary methylated spirit; as it is essential that all the water should be removed from the specimen, keep the eye in the spirit for some days.

- 5.—Place the eye in the solution of celloidin till it is permeated thoroughly; three or four days at least.

- 6.—Then put the eye, with its cut surface upwards, in a suitable paper box; fill the box with the celloidin solution and leave it exposed to the air for 15 to 20 minutes till a film forms on the surface of the solution.

- 7.—Now place the box containing the eye in methylated spirit, sp. gr. .82 (nearly equivalent to the sp. gr. of rectified spirit). In 24 hours the celloidin will have solidified sufficiently for the removal of the paper, and in 48 hours it will be ready for cutting. It is convenient to remove with a knife the superfluous celloidin, which can be used again by being replaced in the stock solution. By using the spirit of the above mentioned sp. gr., the celloidin is hardened to just the required consistence, and can be kept thus for an indefinite period. This method of embedding was first employed by Otto Becker, at Heidelberg.

The microtome recommended by the author is made by Katsch, Instrument Maker, of Munich. It has a large bath of alcohol (sp. gr. '82) in which both the embedded specimen and the blade of the knife are submerged. As each section is cut it floats off the knife without any crumpling. If required, the sections can be kept for a long time in methylated spirit of the sp. gr. mentioned above.

As a general rule it is preferable to retain the celloidin in the section, for then the exact relative positions of the various parts remain unaltered. In some cases, however, it is desirable to dissolve out the celloidin. It can be done in the following manner:—After staining in the ordinary way the section is placed between two layers of tissue paper and transferred to a mixture of equal parts of absolute alcohol and methylated ether. The celloidin is rapidly dissolved out, and as the specimen is supported by the layers of tissue paper it can be transferred to oil of cloves, and by removal of one piece of tissue paper it can be mounted on the slide with the other piece of tissue paper uppermost; the latter is then easily separated and the cover glass applied with the least amount of disturbance to the specimen. When, as is usually the case, the celloidin is mounted with the section, a modification in treatment is necessary; neither absolute alcohol nor oil of cloves are to be used, for they possess the power of dissolving celloidin. Methylated spirit and oil of Bergamot must take their places respectively. In other respects the methods of staining and mounting are the same as usual. The celloidin in no way interferes with microscopical examination, as it is practically amorphous; it becomes, however, more or less coloured by the various staining reagents used.

*Orbital Tumour.*—Dr. Emrys Jones exhibited a woman, aged 50, the subject of an orbital sarcoma, which had twice been removed, but had recurred.

*Papilloma.*—Mr. Anderson Critchett and Mr. Juler exhibited a case of papilloma of the conjunctiva. It had been first noticed when the patient was nine years old; she was now fourteen. It gave rise to little discomfort.

*Peculiar Conjunctival Affection.*—The same gentlemen showed a woman, aged 50, in whom a peculiar thickening of the conjunctiva, causing almost total obliteration of both culs-de-sac, had occurred after an attack of conjunctival inflammation nine months earlier.



*Paralysis of Right Facial Nerve, with Herpes Zoster of Second Division of the Fifth Nerve.*—Mr. Waren Tay exhibited a case which had at first been under the care of Dr. Stephen Mackenzie. The patient, a man aged 58, found the right side of his face swollen on awaking one morning, and his right eye sore and red; the following day, an eruption came out on the swollen cheek. The zoster occupied the area of distribution of the second, and to a slighter extent of the first, division of the fifth nerve; the cornea was ulcerated; there was well-marked paralysis of the right facial nerve; the faradic contractility was retained; there was slight diminution of sensibility over the part of the face supplied by the second division of the fifth nerve.

Dr. Stephen Mackenzie said that the disease of the eye came on at the same time as the facial paralysis, so that it clearly could not be due to exposure of the eye. The association of paralysis of a motor nerve with herpes zoster was unusual. The electrical condition also of the facial nerve was peculiar.

The President said that, in a certain number of cases, paralysis of motor nerves followed herpes zoster. He had seen it in the third nerve, the facial nerve, and certain muscles of the arm.

*Great Tortuosity of Retinal Vessels.*—Dr Stephen Mackenzie showed a girl, aged 12, who had come under treatment for headache, from which she had suffered for four or five years. The headache was frontal in position, and was not affected by attitude. There was no thoracic disease, and sight and hearing had always been good. Ophthalmoscopic examination showed extreme tortuosity of the vessels, arteries and veins, of the left retina, and moderate tortuosity of the vessels in the right. Dr. Mackenzie thought that such cases ought to be recorded, in order that, in time, some conclusion might be arrived at.

*Loss of Vision and Hearing after Head-Injury.*—Mr. Waren Tay showed a patient who, seven weeks earlier, had fallen down a ship's hold on to his head. He was picked up unconscious. On admission shortly afterwards, he was conscious; blood was oozing from left nostril and right ear; left pupil insensitive to light; no paralysis of facial or any other nerve; fracture of right lower jaw, and laceration of the soft parts in left fronto-temporal



region; no subconjunctival hæmorrhage, and no serous discharge. Two days later it was ascertained that he could not see the light with the left eye. On the eighteenth day the left optic disc was thought to be paler than the right; on the twenty-fourth day it was certainly paler; seven weeks after the injury it was uniformly white, from commencing atrophy. He was markedly deaf on the right side. Mr. Tay observed that statistics showed that injury to the optic nerve was common in fracture of the base of the skull; out of 88 cases, the roof of the orbit was fractured in 80, the optic foramen injured in 54, and blood effused in the sheath in 42. The mode of production of the nerve-atrophy was, as yet, uncertain.

*The Bacilli of Fequirity.*—Dr. W. A. Brailey, with Mr. Pigeon, had made some observations on this subject. The bacilli began to develop about twenty-four hours after the infusion was first made; they became abundant on the next day, and this abundance was maintained for about fifteen days.

*On Anæmia as a Cause of Retinal Hæmorrhage.*—Dr. Stephen Mackenzie narrated a series of carefully-observed cases which, taken together, appeared to indicate that a tendency to retinal hæmorrhage occurs when the corpuscular richness falls below 50 per cent., whatever be the cause of the anæmia. The fact that retinal hæmorrhage is so frequent in the form of anæmia, designated by Addison "idiopathic," and which others call "progressive pernicious anæmia," is probably due to the high degree of anæmia present in such cases (always below 50 per cent.), and not to its kind. The corpuscular richness may fall below 50 per cent. without retinal hæmorrhage taking place; but, when this point is reached, there occurs the tendency to hæmorrhages.

Dr. Angel Money had recently found flame-shaped hæmorrhages in both retinæ at the necropsy of a female child, aged 4. The condition during life was one of intense anæmia. The red discs numbered about 30 per cent. of the normal. The heart and other viscera were in a state of marked fatty degeneration.

*Sympathetic Inflammation after Excision.*—Mr. Nettleship.—A man, aged 41, received severe contused wounds of the right eye and orbital parts, in a railway accident; the injured eyeball was removed within 48 hours by Dr. C. W. Philpot; suppuration occurred in the orbit afterwards. A month later the remaining

eye inflamed and became dim ; and when seen by Mr. Nettleship, six months after the accident, there was moderately severe plastic iritis with much membrane. A month later the eye was better, and the man was lost sight of. The author thought the iritis was sympathetic, and that it was excited by the inflammation of the damaged orbital tissues, rather than by the wounded eyeball itself.

*White Eyelashes after Sympathetic Ophthalmitis.* — Mr. Nettleship. — The patient, a woman aged 23, ruptured the right eye by a fall ; it was excised three months later. The other eye suffered severe subacute irido-choroiditis, ending in softening and almost complete blindness ; all the lashes of both its lids became white. The lashes of the first eye remained unaltered. The exact date of onset, in relation to the excision of the other eye, could not be determined. Mr. Hutchinson had described a case in which both eyes were lost by spontaneous irido-choroiditis, and many of the lashes became white. Such cases favoured the theory, of late somewhat discredited, that the fifth nerve, or at least the ciliary nerves, formed the channel for communication of sympathetic inflammation from one eye to the other.

The President thought that the blanching of the eyelashes, and of the hair elsewhere, depended on a neurotic affection. He mentioned a case in which, as the result of a severe illness, probably of a neurotic nature, the skin exhibited a condition of well-marked pityriasis rubra, and the whole hair of the scalp, as well as a small patch in each eyelid, became white.

Mr. Adams Frost referred to a similar case, recorded by Jacobi, in *Zehender's Klin. Monatsbl.* 1874, p. 153.

*Transmission of Sympathetic Ophthalmia.* — Dr. Brailey. — This paper described the various sympathetic affections of the eye, and their bearing on the mode of transmission from one eye to the other. The iris is involved in every case, either alone or in association with the ciliary body, or with the choroid, or with both. The iris presents either clusters of cells in its middle layers, or a continuous infiltration with cell-elements ; also in all but mild cases a thick exudation over all its posterior surface. Cells are found also either in clusters or in a continuous layer on the lower part of the posterior surface of the cornea. The affection of the ciliary body and choroid is similiar, only there is no exudation on the surface of the latter, while in the former

it occurs on the internal aspect of the pars ciliaris retinae. There are also cells round the blood-vessels of the papilla, extending thence along the central vessels of the optic nerve. The author recognises a pure sympathetic keratitis, and a pure sympathetic papillitis, both being not uncommon but difficult to identify. He attributes certain uncomplicated cases of atrophy of the disc, of vitreous opacities, and even of retinal detachments to sympathetic disease. He found diversity in the first eye. The primary affection was a pure iritis or irido-cyclitis, or irido-cyclo-choroiditis in more than half the cases; a kerato-iritis in about twenty per cent.; a distinct iritis, with keratitis punctata, in about thirty per cent. This last form is probably more common than these figures would indicate, as dots were in some cases found early, but not later, and, conversely, sometimes at the later stages only of the inflammation. The exciting eye might be shrunk after panophthalmitis, or even a choroidal sarcoma. Perforating wounds produced it in about eighty per cent. of the cases, and spontaneous inflammations in about fifteen per cent. There was no relationship as regards the precise position of the disease in the two eyes, and this fact as well as cases in which the outbreak is long delayed tell against the theory of direct transmission, either by the sheath of the optic nerve, or by the optic or ciliary nerves themselves. He thought that sympathetic irritation, whether producing pain or congestion only, might, owing to the unique relationship between the two eyes, so alter the nutrition of the second eye as to render it liable to spontaneous inflammations of any kind; and that such liability persisted after excision of the first eye, whether through the state of the sympathising eye itself, or of the centre of the fifth nerve. He thought that glaucoma could be produced sympathetically by glaucoma in the first eye, and that it was a neurosis of the secretory nerves of the eyeball. He drew attention to the similarity between the pathological changes he had previously pointed out in this disease, and those found by Levascheff in the lower limbs of animals after long-continued irritation of the sciatic nerve.

Mr. G. A. Critchett referred to the case of a young man under his care, in whom sympathetic inflammation came on three weeks after excision of the other eye, which had been lost in childhood from ophthalmia neonatorum.

The President said that discussion of this important subject would arise at the next meeting.

*Cerebral Hamorrhage, with Passage of Blood into both Optic Nerves.*—Mr. Priestley Smith said he was indebted to Dr. Leslie Phillips for the opportunity of recording this case. Dr. Phillips had had charge of the patient during life, and had made the *post mortem* examination. A man, aged 38, had a fall on March 8th; the next day he had a fit, but showed no decisive symptoms until March 18th, when headache began. On March 20th he vomited, his mind became clouded, and he was brought to hospital, with symptoms of intracranial pressure; the optic discs were examined with the ophthalmoscope, and found healthy; insensibility increased, and at 4 A.M. on March 21st he had a fit and died. *Post mortem* examination showed a large quantity of blood beneath the dura mater on the left side, proceeding from a recent hæmorrhagic cavity in the left frontal lobe, opening through a clean rupture of the cortex in the inferior frontal convolution. The optic nerves were distended; one was opened at once, and found to contain blood; the other was hardened in Müller's fluid. On longitudinal section it was found to contain a blood-clot, the situation of which appeared to demonstrate the existence of two distinct spaces around the nerve—a subdural and a subarachnoid—as described by Schwalbe. The blood lay entirely in the subdural space, the space which, from its situation beneath the dura mater, it would naturally enter. The subarachnoidal space of the nerve was distended with colourless fluid, probably cerebrospinal fluid forced into it from the subarachnoid space of the meninges, by the increased pressure within the skull. The case, unfortunately, gave no evidence as to the ophthalmoscopic changes and visual impairments which might be caused by hæmorrhage into the nerve-sheath. The discs were examined by Dr. Phillips eighteen hours before death, and then appeared healthy, but it was by no means certain whether the blood had, at that time, found its way into the nerves. One-half of the nerve in longitudinal section, and an enlarged drawing of the same, were exhibited.

*Model illustrating Conjugate Movements of the Eyes.*—Mr. Priestley Smith.—The eyes were represented by two discs of wood, covered with paper, and painted so as to represent

horizontal sections of the globe; these rotated about their centres upon screws fixed into a black board. The motor apparatus, so far as horizontal movements of the eyes were concerned, was represented by silk threads attached to the sides of the wooden discs, like the tendons of the recti to the eye-balls; these passed backwards, as the nerves passed to the brain, each of the four nerve-trunks being represented by a double thread. Each thread then separated from the other thread of its own nerve, so as to represent the co-ordination in the brain, by means of which all motor impulses to the eyes were made bilateral. The brain-centres were represented by four brass weights hung upon the threads; one of these combined the threads coming from the two third nerves, and produced movements of convergence; another combined the threads coming from the two sixth nerves, and produced movements of divergence; the two others combined, in each case, a thread from the third nerve of one eye with a thread from the sixth nerve of the other eye, and produced conjugate movements to the right and to the left respectively. The model being placed in a vertical position, it was easy, by pressing upon one or other weight, or upon two simultaneously, to imitate any compound movement of the eyes in the horizontal plane. The model had been found useful in class demonstration. It served to explain the occurrence of conjugate deviations in hemiplegia. It showed how one and the same muscle might be paralysed for conjugate lateral movement, and at the same time active for convergence, *vice versâ*. It illustrated how it was that an ordinary convergent squint, though a bilateral affection, was transferred at will from one eye to the other, and thus manifested in one eye only at a time.

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## REFLEX AMBLYOPIA AND THROMBOSIS OF THE RETINAL ARTERY.

BY PRIESTLEY SMITH.

(Continued from page 20.)

In the following case one eye suffered an attack of sudden, complete, and permanent blindness. Examined on the fourth day of the blindness the eye presented the appearances which denote blocking of the retinal artery, and which are commonly attributed to embolism. Moreover, the patient was found to have valvular disease of the heart. But the idea of embolism is here opposed and the diagnosis of thrombosis is rendered highly probable by the fact that the attack of permanent blindness had been preceded by a long series of attacks of transient blindness.

CASE II. Jane K. (L. 561), aged 40, married, applied at the Queen's Hospital on *December 4th*, 1883, on account of blindness of her right eye.

*History:* During the last three or four years she has had many attacks of dimness of sight; at first this happened only at distant intervals, lately much oftener, sometimes several times in one day; she usually has no warning, but suddenly feels giddy, and then the sight goes instantaneously; the blindness never occurred in both eyes at once; she thinks it may have been sometimes in one and sometimes in the other, but about this she is not at all certain; she often put her hand over the good eye in order to try the other, and found that she could not see the light with it: the blindness lasts sometimes for half an hour, more often for a few minutes only; she has not noticed in what direction sight returns; she always has a bad headache after the attack, but does not go to sleep. *Present attack:* While blacking the grate on *December 1st* (three days before admission) she felt queer in the head, and then went suddenly blind in the *right eye*; she sat down, waiting for the

sight to return as usual, but has had no perception of light in this eye since; much pain in the head during the rest of the day.

*Condition on examination:* My colleague, Dr. Suckling, physician to the Hospital, kindly examined the patient with regard to her general condition, and gave me the following note:—Cardiac hypertrophy with aortic obstruction; urine free from albumen; rheumatic fever at ten years of age, and repeated rheumatic pains since; no history of syphilis; the woman seems to be a drinker.

*Right eye:* V = O; media clear; retina presents the appearances usually considered indicative of embolism of the central artery; on the disc the arteries are extremely small and almost empty, and beyond it are almost invisible, in some places being quite lost in the cedematous haze of the retina; the veins are very small at the disc, but increase slightly in size in the direction of the periphery; around the disc and the macula the retina shows the hazy whiteness of cedema; the macula stands out in strong relief as a “cherry red spot;” close to the lower margin of the disc is a patch of blood in the retina.

*Left eye:* M  $\frac{1}{30}$ , V  $\frac{20}{20}$  imperfectly; media clear; fundus normal; field, mapped with perimeter, entire.

The patient was further examined several times at short intervals. Four weeks after the onset of the blindness it was noted that the haze of the retina had completely disappeared; the vessels remained very small, the disc pale; a group of small round blood-patches were now visible above and to the outer side of the disc. V = perception of light at or near the yellow spot. The other eye remained unchanged.

In the next example the patient was not seen until three years after the loss of sight occurred, but the ophthalmoscopic appearances allowed of no doubt that the retinal circulation had been arrested. Here there had been no failure of vision previous to the blinding attack, and the seeing eye suffered no attacks afterwards. A diagnosis of embolism would meet the case completely were it not confronted by one small point in the history a point which the narrative clearly establishes, namely that for a few minutes, at the onset of the blindness *both* eyes were blind.

CASE III. Charles H. (L. 368), aged 38, police constable, came to the Queen's Hospital on *September 14th*, 1883.

*History*: Has always been a healthy man, but used to suffer from "indigestion." Three years ago, being on night duty as constable, he took a bad cold on his chest, and was ordered off duty on a Friday. He spent the Saturday indoors; slept well Saturday night; being better on Sunday morning, ate a hearty dinner of beef and cabbage, and then went to bed again to have his usual afternoon sleep preparatory to going on duty at night. He waked suddenly, feeling giddy and queer, and found that he was blind in both eyes, except that he could see something like stars before his eyes. He called out to his wife that both his eyes were blind. He groped his way downstairs by feel, being unable to see anything. In a few minutes the sight returned to the *right eye*: the *left eye* remained nearly blind, but gradually recovered a little sight. His sight had never been bad before, and the other eye has not been bad again.

*Condition on examination, three years after the attack*: Patient is a fine, healthy-looking, rather stout man. Heart sounds normal. Urine free from albumen. *Right eye*: E. V  $\frac{20}{20}$ ; fundus healthy; field, mapped with perimeter, entire. *Left eye*: V  $\frac{10}{200}$  but limited to an extremely small central area, the rest of the retina being quite blind. Disc white, its cribriform structure very distinct; veins very small in all parts of retina; arteries so small as to be barely visible.

There was no disease of the heart in the foregoing case, and there was no evidence of any habitual tendency to vascular disturbance in the brain or retina. Yet the loss of sight was manifestly due to temporary arrest of the retinal circulation, for in the one eye the arteries remained permanently empty. It is noteworthy that the blindness occurred in connection with sleep after a heavy meal, the patient taking on that occasion, contrary to his usual custom, two bouts of sleep with only a few hours interval. It seems likely that in this instance the retinal anæmia was a reflex effect proceeding from the stomach. With dyspeptic persons it is a familiar experience that the heavy sleep into which they

are apt to fall after a full meal is followed at the moment of waking by extremely unpleasant sensations in the head, with disordered action of the heart. Spasmodic contraction of arterioles is said to be a common result of lithiasis. The manner in which vision was annihilated in this case suggests the probability that if the cerebral vessels could be inspected during life a similar cause might be found for some of the slighter forms of paralysis and paresis to which plethoric, gouty, dyspeptic persons are liable.

The following case came under my notice more than ten years ago; the record is incomplete, but not without interest. Here there were many transient failures of vision. During the blinding attack both retinæ were involved completely, as in the preceding case, but the blindness proved permanent only in the lower half of one. It seems likely that there was here some slight peculiarity in the calibre, the mode of division, or the bending of the lower branch of the retinal artery, which was especially unfavourable to the speedy re-establishment of the blood stream.

CASE IV. Mary H., aged 25, unmarried, was a patient at the Birmingham Eye Hospital in 1873, under the care of the late Mr. Arthur Bracey, during the time of my House-surgeoncy.

*History:* For fifteen months past she has been a shop-assistant, serving behind the counter thirteen hours a day. The last six months she has had strange nervous forebodings and has been often giddy. An hour or two after breakfast every day she has a craving for food and feels giddy and sick, but does not vomit; these attacks last about half an hour and then pass off, leaving her well until the same time next day. Sight usually impaired during the attacks; at first only as a dimness or a swimming of objects before the eyes, but lately the sight has been sometimes quite lost for half an hour. Six weeks ago (five months after the attacks first began) she was seized one day with extreme giddiness and both eyes went blind; she did not become unconscious. Half an hour later sight came back to the *left* eye, and to the lower half of the

*right eye.* Has noticed that in the *left eye* the sight always returns from above downwards, *i.e.*, she sees above first, then on a level with her eyes, and lastly below. In the attack in question the *right eye* recovered in the opposite direction; namely, from below upwards as far as the level of her eyes, but no further. She cannot tell whether this eye always recovered in this direction in previous attacks. No family history of epilepsy or other disease.

*Condition on examination:* Patient looks in good health; bowels and menstruation regular. (No examination made of heart.) *Right eye:* V  $\frac{20}{40}$ ; accommodation good; field lost above; roughly mapped on blackboard, line of demarcation horizontal and exactly through fixation point. *Left eye:* V  $\frac{20}{20}$ ; accommodation good. No ophthalmoscopic change in either eye. (I then used the indirect method only, and do not rely on this statement as definitely excluding alteration in size of arteries. There are, however, several cases on record which prove that the retinal arteries may recover a normal appearance, although the blindness caused by their temporary emptiness be lasting.)

To the foregoing I may add a note of a case, the only one of the kind which I have met with, in which transient loss of vision was strictly limited to the lower half of the field. Leber mentions this form of visual trouble as being occasionally met with, and groups it with the temporary hemiopic defects which occur with migraine. (Graefe-Saemisch, Vol. V., p. 945.) But the situation of the blinded area in relation to the visual field seems to indicate an essential difference between the two disorders. A visual trouble of true hemiopic type, whether it be permanent or fleeting, indicates a disturbance somewhere behind the optic commissure, and there is the strongest reason for connecting the hemiopia of migraine, which is often of quite typical form, with vascular disturbance in certain areas of the cerebrum. A visual trouble dividing the whole field horizontally has not, so far as I know, ever been traced to a cerebral lesion, and there are no anatomical facts



by which it could be thus explained ; it is, on the other hand, a well established and intelligible result of vascular disturbance in the retina itself. By the arrangement of its nerve fibres, in relation to the cerebral centres, the retina is divided vertically ; by the arrangement of its own blood-vessels it is divided, roughly speaking, horizontally. The explanation of the symptom in the following case is to be found, I imagine, in some transient cause of diminished blood-flow to the eyes telling more in the upper half of one retina than elsewhere, simply because of some peculiarity in the upper branch of the retinal artery favourable to a reduction of the blood supply.

CASE V. Miss Lucy M., aged 18, was brought to me on August 6th, 1882, for an opinion as to the importance of an occasional peculiar failure of vision.

*History :* During the last two or three years she has quite occasionally, perhaps six times altogether, had an attack of dimness of the right eye, during which the lower half of objects was lost. It comes on suddenly ; there is no giddiness before or afterwards ; after about a minute she begins to see again below and to the outer side, so that there is then a wedge-shaped cloud across her sight just below the horizontal line ; then this clears away altogether. The pupil of the affected eye is very large while the attack lasts ; she has seen this in the looking-glass, and her mother has seen it ; she cannot say whether the other pupil is enlarged also. She had such an attack this morning. She is quite certain that it is always in one eye only, and that this morning it was in the right eye, but cannot be certain that it has always been in this eye. She has good health. She has worked hard for a school-examination lately, though not the last fortnight. Menstruation irregular—five, eight, and ten weeks' intervals.

*Both eyes :* E, V=1, accommodation good ; fields entire, and ophthalmoscopic appearances normal. The vein in the upper half of *right* retina (the area presumably affected) perhaps rather over-full.

In a case which I saw in Mr. Streatfeild's clinique at Moorfields years ago, and which, with his permission, I

sketched and noted down at the time, and now refer to, permanent blindness of the upper half of one retina was found to depend upon obliteration of the upper division of the retinal artery. In this instance the probability leans rather towards embolism than towards thrombosis. The symptom which is conclusive against embolism, namely, simultaneous failure of *both* eyes at the onset, was wanting here. In favour of thrombosis is the fact that there had been transient failures of vision before the permanent seizure occurred; decidedly opposed to it is, I think, the statement that the attack was entirely unaccompanied by any giddiness, headache, or other sign of vascular disturbance, but consisted solely in an instantaneous loss of sight while the patient was sitting still, whereas headache had followed the previous transient failures of vision. There was organic disease of the heart. There is, of course, no reason why the two distinct accidents—failure of retinal circulation from insufficient heart-power, and embolism by particles formed on the cardiac valves—should not sometimes occur in the same person. I record the case simply to illustrate the dependence of “horizontal hemiopia” upon retinal and not upon cerebral disturbance. Similar cases have been recorded by Barkan and Knapp (“Archives of Ophthalmology,” vol. iii., p. 33 and 36); I venture to think that two of these four cases—namely, Dr. Barkan’s case and Dr. Knapp’s third case, were instances of thrombosis, and not of embolism as supposed, for both eyes were attacked simultaneously in each case, and in one the blindness came on with faintness, in the other with intense headache.

CASE VI. Louisa P., a German, aged 20, unmarried, was a patient at Moorfields in the spring of 1874, under the care of Mr. Streatfeild.

*History:* One evening, seven weeks ago, while sitting quietly in a chair, she noticed a sudden darkness in the right eye, and found that in this eye she had lost the sight of everything below the level of the point looked at; above that

level everything was seen as well as before. She felt no giddiness, no headache or other pain, and no flash of light or other symptom of any kind. She is not aware that any change has occurred since then. She says that she has had occasional attacks of loss of sight, lasting five or ten minutes, and followed by headache; she thinks only one eye was affected in these attacks, but does not know which. She has no knowledge of having had rheumatic fever, but is not sure; she has occasional pains in the joints.

*Conditions on examination.*—A loud mitral murmur. *Right eye* blind below horizontal line; line of demarcation, mapped on black board, passes exactly through fixation point, and at about  $30^{\circ}$  to the outer side of this point sinks rather abruptly to a somewhat lower level, *i.e.*, the sentient (upper) half invades the non-sentient (lower) half.\* High hypermetropic astigmatism in horizontal meridian corrected for examination and sketching of fundus; V not noted. The upper division of the retinal artery shrunk to fine threads, one branch quite white, the others showing a very thin red line; the lower division of normal size. The upper division of the vein slightly smaller than the lower, but not greatly reduced.

One more case must be referred to, because it presents features not to be found in any of the preceding examples. Here there was arterial degeneration, but no valvular disease of the heart. The fact that the blindness yielded twice to rubbing of the affected eye, but returned a third time on the following day, is opposed to the idea that the artery was obstructed by an embolus brought to it from a distance.

CASE VII. (I. 584). Catherine R., aged 70, came to the Queen's Hospital on November 29th, 1881, complaining of blindness of her left eye.

*History:* Nine weeks ago she had bronchitis, which she always has in the winter, and was much tired by nursing an invalid son, when one day after a bout of coughing and heaving

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\* A figure of this field is given in Gower's "Medical Ophthalmoscopy," 2nd edit., p. 35; a figure of the fundus and an account of the case appear in the same book. Dr. Gower's record and my own were made independently.

at the chest it seemed as though her left eyelid suddenly came down ; she put her finger to her eye and found that the lids were wide open, but that the sight was gone ; she rubbed her eyelids, and the sight came back again almost immediately. A few minutes later the eye went dark again ; she rubbed it again and the sight came back as before. The next day while she was walking in the street the same eye suddenly went dark again ; she rubbed it well, but this time without effect ; the eye has remained blind ever since.

*Condition on examination (nine weeks after the blindness began).*

*Right eye:* Hm. about  $\frac{1}{20}$ ; V  $\frac{20}{60}$  imperfectly ; pupil very small but active ; arteries and veins of retina considerably below the normal size, but not so thin as in the other eye ; disc of fairly good colour considering patient's age. *Left eye:* V = slight perception of light at yellow spot ; pupil very small, but not quite so small as that of right eye ; acts consensually, but not independently ; arteries and veins of retina extremely fine ; disc white. My colleague, the late Dr. Hunt, examined the patient and noted accentuation of the cardiac apex-beat but no valvular lesion ; chronic bronchitis ; signs of general arterial degeneration.

In the text-books of ophthalmology to which I have been able to refer, embolism of the retinal artery receives ample consideration, but spontaneous thrombosis is either not mentioned at all, or mentioned only in the very briefest manner. It would appear that signs of blocking of this artery are commonly taken to be sure indications of embolism. Yet good reason for a different view has been put on record by more than one writer. Loring, in 1874, published a series of five cases in which a diagnosis of embolism was the first to suggest itself, and was in fact maintained by some observers, but in which, in his opinion, a more satisfactory explanation was afforded by the theory of thrombosis. His discussion of the question concludes with the suggestion "that in the train of symptoms classed under the title of embolism, too much significance has been laid upon the stoppage of the circulation by the importation of a plug formed at a distance from the

eye, while not enough has been laid upon the mechanical actions regulating the supply of blood within the eye, as well as upon the conditions of the walls of the vessels themselves and their contents." (*American Journ. of Med. Sciences*, Apr. 1874, p. 328.) Nettleship, in 1879, called attention to a group of cases characterised by "repeated paroxysmal failure of sight in connection with heart disease," and showed that attacks of this kind may lead to permanent loss of sight with ophthalmoscopic changes resembling those of embolism (*Brit. Med. Journ.*, June 14, 1879.) My own cases now published support the same conclusion, and somewhat extend the class of cases, I think, to which the theory of thrombosis will apply, for they show that loss of sight, permanent as well as transient, from diminished blood supply to the retina, occurs in other persons besides those who have organic disease of the heart.

If it be granted that the signs above referred to are equally well explained by thrombosis, then I think that not a few of the cases recorded as embolic will be found, when carefully examined with regard to the circumstances which attended the attacks, to take a more natural place in the other category. The points in the history which aid in drawing a distinction have been already stated (page 8).

The importance of distinguishing between these two conditions is, in some cases at any rate, considerable; for whereas in the case of plugging by an embolus treatment can rarely, if ever, avail anything for the sight, there is reason to suppose that where the retinal anæmia arises from other causes a timely interference might sometimes prevent a simple stagnation of the blood-stream from passing into the condition of permanent blocking of the vessel. In one of my cases (case vii.) the darkness which overspread the sight was twice dispelled by rubbing the eyelids. Under ordinary circumstances it requires no very violent rubbing of the lids to momentarily obscure the sight; the blood-

stream in the retinal artery is checked or driven back upon itself by the pressure, and the exit of blood by the veins is at the same time accelerated. On the removal of the pressure the globe is left for a moment slacker than before, and the returning wave of arterial blood then advances under a diminished resistance. When a slow and feeble stream is just hesitating, as it were, whether to come to a standstill or not, it is quite possible that such a fillip might sometimes carry it over the points of chief resistance, and suffice to set it once more permanently in motion. Iridectomy has been proposed as a means of encouraging the obstructed circulation by lowering the pressure within the eyeball. In the case of embolism the utmost which could be effected by this means would be the driving onward of the obstructing body from the main trunk of the artery into one of its branches, and the consequent readmission of the blood-stream to the other branches; but even this result would seem to be little likely of attainment. On the other hand, if the retinal anæmia be clearly due to heart failure, or other extra-ocular disturbance of the circulation, and if it be still in an early stage, the immediate reduction of the intraocular pressure by iridectomy, or by simple paracentesis, would offer a reasonable hope of success. Loring quotes a case of complete blindness attributable to reduced action of the heart in which Alfred Graefe performed iridectomy in both eyes, and complete restoration of vision followed. (*Loc. cit.* p. 324, and von Graefe's Archiv. viii., p. 143, 1861.)

The distinction between embolism and thrombosis is probably more important, however, in relation to the foreseeing and prevention of the accident than in relation to its immediate treatment. Embolism of the retinal artery can certainly never be foreseen, and, when it has occurred, we can neither pronounce the fellow eye absolutely free from danger, nor take any measures for its protection. On the other hand, it is practically important to know that the attacks of transient blind-



ness, affecting one or both eyes, which we meet with not unfrequently in practice, involve some danger of permanent loss of sight. By treatment of the constitutional faults on which these attacks depend, and by careful avoidance of the exciting causes, much may be done in some cases to diminish their frequency, and thereby to lessen the danger of blindness to which the patient is exposed. Especially where, one eye being already blind, the fellow eye is repeatedly attacked with temporary obscurations, is preventive treatment urgently demanded. In the first case recorded in this paper (page 2) the removal of the uterine appendages by abdominal section effected the recovery of useful sight in an eye, which, up to the very day of operation, was increasingly threatened with blindness.\*

A point of interest in relation to the conditions known as reflex and hysterical amblyopia remains to be noticed. In the case just referred to, and in Nettleship's two cases, the eye which escaped permanent blindness suffered, in addition to many transient attacks of loss of sight, a more or less persistent contraction of the field of vision. Is this condition also to be referred to an impaired blood supply to the retina? There are certainly strong reasons for such a conclusion. In the first place, seeing that the contraction of the field in my case made its appearance as the transient attacks of blindness increased in severity, and disappeared when they ceased, it seems highly probable that both defects arose from the same cause, the temporary total obscurations being simply an aggravation of the more lasting peripheral contraction. Then it is significant that when the blood supply to the retina is diminished by pressure, whether arising within the eyeball as in glaucoma, or produced by the finger applied externally, the field contracts in a very similar manner. Nettleship describes

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\* On January 13th, three weeks after the patient's discharge from the General Hospital, Mr. George Lowe, of Burton, wrote me that there was steady improvement in health and vision.

the contraction in one of his cases in these words: "Though central sight was normal, the field of vision was smaller in all directions than in health, and the visual field for red was markedly contracted, conditions which might probably be accounted for by a deficient general supply of blood to the retina."

Now, the interesting point is that the conditions present in these eyes were exceedingly like the affection known as "hysterical amblyopia," "retinal anæsthesia," or "neurasthenic asthenopia." (*Vide* O. R., January, 1884, p. 10.) All the three patients were young adults of nervous temperament; in Nettleship's first case it is expressly stated that the asthenopia was of the kind common in young nervous adults; in my own case (case i.) the resemblance to the hysterical variety was made all the stronger by the manifest connection of the eye-troubles with disease of the ovaries. I have lately carefully examined with the perimeter, and otherwise, at least half a dozen cases of well-marked "neurasthenic asthenopia" in children and young adults, and have found the closest possible resemblance between their symptoms and those of the right eye of my patient, Mrs. W. (case i.). If this resemblance in the symptoms really indicates a similarity of cause, then we are forced to the conclusion that in "neurasthenic asthenopia" also a deficient nutrition of the retina is the immediate cause of the visual defect. As a matter of fact we do not often see attenuation of the retinal vessels in these cases; the tendency is usually rather towards engorgement, especially of the veins. Venous engorgement is, however, almost equivalent to arterial anæmia as a sign of retarded circulation, and as a further sign of the same thing a slight œdema is sometimes visible around the disc. (*Vide* Wilbrand, O. R., vol. iii., p. 15.)

The most striking feature of these cases is the *instability* of the retinal nutrition, as shown by the flickering and rapidly changing character of the vision, and this may reasonably be connected with the excess

of reflex excitability which the patients usually present, such action telling upon the retinal circulation through vaso-motor changes as well probably as through an effect upon the heart. In the case of a little girl, aged 11, now under my care, suffering from neurasthenic asthenopia of very pronounced character, this instability is shown by the fact that if the child runs quickly upstairs she is for a moment or two quite unable to see the objects around her ; she has no disease of the heart. An impoverished state of the blood is doubtless an auxiliary cause in many of these cases, but appears to be less important than nerve-influence, for the contracted field is by no means the rule in cases of constitutional anæmia, and is met with sometimes where there is no marked sign of blood-impairment.

These considerations point with some cogency to the conclusion that the contracted field of neurasthenic asthenopia is the expression of an impaired nutrition of the retina, rather than of parts more deeply seated. This conclusion is, of course, no denial of the position so well laid down by Wilbrand that neurasthenic asthenopia is not an isolated disorder, but a part of a widely-spreading disturbance of the nervous system. It is, however, in apparent opposition to the well known doctrine of Charcot, which attributes a concentric contraction of the visual field in certain cases of hysteria to a central disturbance. It is hardly possible to believe that the retina is at fault in one person, the internal capsule in another, when the characters of the visual defect and the type of the general nervous condition are the same in both.\*

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\* At the moment of completing this paper I find in the January number of the American Journal of the Medical Sciences an article by M. Allen Starr, in which the whole of the evidence for and against Charcot's doctrine of crossed amblyopia from central disease is carefully examined. The author finds it unsubstantial. He reaffirms the old and simple doctrine that "when a lesion of one hemisphere involves the optic fibres at any point, partial blindness of both eyes, and not blindness of the opposite eye, is produced" (p. 76).

## SUMMARY.

Blocking of the retinal artery is due, in a considerable proportion of cases, to spontaneous thrombosis.

The causes of this accident are—heart failure, either from disease of the heart itself or from other causes ; loop at the edge of the lid (between *c* and *e*) ; the free ends of the ligature are now drawn tight, and tied moderately tightly over the lower part of the india-rubber tube. The excess of india-rubber tube is cut off—about a quarter of an inch beyond the ligature—and the operation is complete.

The result of the procedure is that the edge of the lid is made to revolve inwards over the upper edge of the piece of lead, while the tarsal cartilage is caused to mould itself to the curve of the lead, and the eyelid at once occupies its normal position. A certain amount of redness and œdema of the lid follow the operation, and suppuration occurs in the track of the ligature ; but as the india-rubber tube yields somewhat to the tension on the ligature, the irritation resulting is moderate, so that the apparatus need not be removed for five, six, or seven days, by which time the cartilage has become pretty well fixed in its new curvature. A *neurasthenic asthenopia* (hysterical amblyopia, retinal anæsthesia) is the expression of an impaired nutrition of the retina, not of a central disturbance.

ARGYLL ROBERTSON (Edinburgh). A new Operation for Ectropion. *Edin. Clin. and Path. Journ.*, Dec., 1883.

By means of the operation described and figured below the author has obtained very satisfactory cures in several cases of that obstinate variety of ectropion which results from long-continued chronic inflammation of the conjunctiva of the lower lid. Five eyelids had been operated on at the time of writing ; complete cure was obtained in three cases ; in one the ultimate result was not known ; in the remaining case the sutures had not been removed and the final result could not be stated.

The materials required are—

I.—A piece of thin sheet-lead about 1 inch long and  $\frac{1}{4}$  inch broad, rounded at its extremities, and with its cut margins smoothed. This piece of lead must be bent with the fingers to a curvature corresponding to that of the eyeball.

2.—A waxed silk ligature about 15 inches long, to either extremity of which a long moderately curved needle is attached.

3rd.—A piece of fine india-rubber tubing (the thickness of a fine drainage tube).

asthenopia or very pronounced character, this instability is shown by the fact that if the child runs quickly upstairs she is for a moment or two quite unable to see the objects around her ; she has no disease of the heart. An impoverished state of the blood is doubtless an auxiliary cause in many of these cases, but appears to be less important than nerve-influence, for the contracted field is by no means the rule in cases of constitutional anæmia, and is met with sometimes where there is no marked sign of blood-impairment.

These considerations point with some cogency to the conclusion that the contracted field of neurasthenic asthenopia is the expression of an impaired nutrition of the retina, rather than of parts more deeply seated.

The operation is performed by perforating the whole thickness of the lid with one of the needles at a point (*b*) one line from its ciliary margin, and a quarter of an inch to the outer side of the centre of the lid. The needle having been drawn through (at *a*), is passed directly downwards over the conjunctival surface of the lid till it meets the fold of conjunctiva reflected from the lid on to the globe through which the needle is thrust—the point being directed slightly forwards,—and pushed steadily downwards under the skin of the cheek until a point (*d*) is reached about 1 inch or  $1\frac{1}{4}$  inches below the edge of the lid, when the needle is caused to emerge, and the ligature is drawn through. The other needle is in like manner thrust through the edge of the lid at a corresponding point (*b'*) a quarter of an inch to the inner side of the middle of the lid, then passed over the conjunctival surface of the lid, through the oculo-palpebral fold of conjunctiva, and downwards under the skin till the point emerges at a spot (*d'*) a quarter of an inch

inwards from the point of emergence of the first needle (*d*). The ligature is kept slack, or is slackened so as to permit of the piece of lead being introduced under the loops of the ligature that pass over the conjunctival surface of the lid, and of the piece of india-rubber tubing (*c*) being slipped under the loop at the edge of the lid (between *b* and *b'*). The free ends of the ligature are now drawn tight, and tied moderately tightly over the lower part of the india-rubber tube. The excess of india-rubber tube is cut off—about a quarter of an inch beyond the ligature—and the operation is complete.

The result of the procedure is that the edge of the lid is made to revolve inwards over the upper edge of the piece of lead, while the tarsal cartilage is caused to mould itself to the curve of the lead, and the eyelid at once occupies its normal position. A certain amount of redness and œdema of the lid follow the operation, and suppuration occurs in the track of the ligature; but as the india-rubber tube yields somewhat to the tension on the ligature, the irritation resulting is moderate, so that the apparatus need not be removed for five, six, or seven days, by which time the cartilage has become pretty well fixed in its new curvature. A slight relapse may occur when the apparatus is removed, but this is readily amenable to treatment by astringent applications.

The suppuration occurring in the tracks of the ligature leads to cicatricial formation, which appears to impart a degree of rigidity to the lid and helps to keep it in its new position.

**BADAL (Bordeaux).** Treatment of Glaucoma by Rupture (Arrachement) of the External Nasal Nerve. *Annales d'Oculistique*. Sept.—Oct., 1883, p. 89.

The author was induced to try the effects of this treatment in glaucoma by the good results he obtained from stretching the external nasal and infraorbital nerves in a case of violent neuralgia of the first two divisions of the fifth nerve complicated with profuse ozæna. He explains the results in the last case by supposing that the injury to the nerve produced an alteration in its functional activity, changing a condition of abnormal excitability and hypersecretion of the pituita into one



of diminished excitability and consequent lessened secretion. On the same principle he hoped, by rupturing the external nasal nerve, to lessen secretion inside the globe, and produce a lower intraocular tension. Badal believes that the other operations used in treating glaucoma—iridectomy, sclerotomy, and Hancock's section—depend for their efficacy upon the same principle, their relative value being proportionate to the number of nerve-fibres injured. The effect produced is conjectured to depend upon an enfeeblement of the vasodilators, which reduces their activity to its normal limit. This hypothesis falls in with the theory that glaucoma is a secretory neurosis, proposed many years ago by Donders, and is also not altogether inapplicable to the now more generally accepted view that the disease depends upon obstruction to the channels of filtration through which the intraocular fluids make their escape. If the neurosis theory be true, then the curative influence of the new operation is to be explained by its arresting the hypersecretion; on the other supposition it is to be assumed that secretion is reduced to a point compatible with the retarded excretion. Badal thinks, however, that his hypothesis is not applicable to those chronic simple glaucomas which occur so frequently in aged hypermetropes; he considers none of the current theories explain these cases satisfactorily, and is inclined, for his own part, to account for them principally by a want of elasticity in the eyeball, which prevents the compensatory enlargement that should take place during the ventricular systole. This form of glaucoma, he considers, cannot be cured except by the production of a cystoid cicatrix having the elasticity in itself to replace the lost elasticity of the eyeball. In some cases, after rupturing the external nasal nerve, he has observed the pain to disappear, although the tension of the globe remained unaltered. He prefers his method of tearing, . . . to neurotomy, excision of the nerve, or stretching, because of its simplicity, and its greater effect. . . .

Twenty eyes were treated by this method in 18 individuals, which, added to the cases published by Abadie, makes 25 cases in all. In 19 cases the tension was lowered. In 20 cases, where the glaucoma was acute, or subacute, the operation relieved the pain, often almost instantaneously. In four of

these cases iridectomy had done mischief, and in two of them sclerotomy had transformed chronic glaucoma into acute. In six other cases sclerotomy had proved useless, and in four iridectomy had been unsuccessful. Of two cases of acute glaucoma, when the prognosis was relatively favourable, one was completely cured and the other was lost. In three out of six cases of long-standing loss of vision sufficient improvement occurred to enable the patients to walk alone. In those cases where rupture of the nerve failed, iridectomy or sclerotomy performed subsequently also failed. In no case were the symptoms aggravated by the operation.

The combination of this operation with sclerotomy or iridectomy, which Abadie has advocated, Badal would only allow in cases of fulminating glaucoma, where immediate reduction of tension is imperatively indicated. Badal acknowledges that the good effects of his operation are slower in manifesting themselves in lessened tension than the effects of iridectomy or sclerotomy, but even in fulminating glaucoma he would only add a simple paracentesis corneæ to the operation upon the nasal nerve.

The operation is performed by simply inserting an ordinary strabismus hook underneath the nerve without taking the pains to isolate it from the small artery which generally accompanies it.

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A. NIEDEN (Bochum). On the Frequency and Hereditary Transmission of Diseases of the Tear-passages. *Centralblatt für prakt. Augenheilkunde*, October, 1883, p. 301.

Nieden advances the idea that obstructive disorders of the tear-passages are, in a considerable number of cases, the result of peculiarities of conformation in the bones forming the nasal duct, transmitted from parent to child. Diseases of this kind constitute, in his practice, 3·6 per cent. of all diseases of the eye, a rather higher percentage than is given by most other authors. He attributes the excess to the prevalence of coal and iron industries in his neighbourhood, and the consequent impurity of the atmosphere.

In 46 instances he met with disease of the tear-passages in parent and child, one child being affected in 43 cases, two

children in 2 cases. These 95 persons formed 9 per cent. of all the cases of diseases of the tear-passages.

Of the above-mentioned, 62 per cent. were females, 38 per cent. males. This confirms the statement of almost all authors that diseases of the tear-passages are much commoner in females than in males.

The coincidence of the disease was more frequent in mother and child than in father and child, in the proportion of 63 per cent. and 37 per cent.

In 58 per cent. of these patients the disease was bilateral, and of these 67 per cent. were females, 33 males. The statistics of other writers show that among all cases taken, without regard to hereditary transmission, the disease is bilateral in a very much smaller proportion than that above given, and this is confirmed by Nieden's own figures. This increased liability to the disease manifesting itself just in those cases where parent and child were both affected favours the idea of hereditary transmission. In 26 cases the disease was bilateral in both parent and child; in 18 cases it affected the same side in both, while in two only did it affect different sides. This, again, points to the same conclusion.

It may be suggested that the apparent heredity depends rather upon a scrofulous diathesis, and a consequent liability to ulceration of the mucous membrane of the nose, ozæna, and so forth, than upon structural peculiarities of the skeleton. Nieden paid special heed to this possibility, but found that, although about 10 per cent. of the adults presented chronic affections of the schneiderian membrane, not 1 per cent. of the children were similarly affected. He believes that the disease in the nostril is more frequently a secondary result of the obstruction in the duct than the primary cause of the latter.

**Statistics of the Blind in England and Wales.**  
*(Extracted from the Census of England and Wales for 1881, published 1883. Vol. IV., p. 60-62; Vol. III., Summary Table XVIII).*

The total number of persons returned as afflicted by blindness was 22,832, being in the proportion of 879 to a million of

the population, or one blind person in every 1,138. The proportion of the blind to the population has decreased with each successive enumeration since 1851, in which year account of them was taken for the first time; but the decrease in the decade ending in 1881 was much greater than in either of the preceding decennial intervals.

YEAR.	Number of Blind.	Blind per Million Persons enumerated.	Persons enumerated to one Blind Person.
1851	18,306	1,021	979
1861	19,352	964	1,037
1871	21,590	951	1,052
1881	22,832	879	1,138

This decrease may be fairly attributed to the progressive improvement in the surgical treatment of affections of the eyes, and to the diminished prevalence among children of such diseases as small-pox, to which a not inconsiderable amount of blindness was formerly due. The extent of the decrease may be stated in the following form. Had blindness been as common an affliction in 1881 as it was in 1851, there would have been 26,523 blind persons in the country instead of 22,832, or 16·2 per cent. more than there actually were.

Of the blind, 12,048 were males, and 10,784 were females, being in the proportion of 953 males and 809 females per million living of each sex. Thus one in every 1,049 males was blind, but only one out of every 1,237 females. In each of the four censuses in which account of the blind has been taken, the affliction has been found to be much more common among males than among females. This is what might have been anticipated, considering the differences between the two sexes in regard to their occupations, their exposure to accidents, and their liability to disease. This natural anticipation is, moreover, confirmed by the statistics of most other countries concerning which we have the necessary data. It is curious, therefore, to note that in Ireland the contrary was found to be the case, both in 1881 and in previous enumerations; and, further, that in this respect Ireland agrees with Finland and the Scandinavian countries in the north of Europe, and differs from the southern parts of Europe. This is shown in the following table:—

## BLIND PER MILLION LIVING OF EACH SEX.

	Males.	Females.
England and Wales - - - -	953	809
Scotland - - - - -	865	827
Ireland - - - - -	1,141	1,219
Denmark - - - - -	776	793
Norway - - - - -	1,313	1,411
Sweden - - - - -	767	843
Finland - - - - -	1,514	2,938
German Empire - - - -	884	881
Hungary - - - - -	1,280	1,123
Holland - - - - -	499	394
Belgium - - - - -	982	641
France - - - - -	948	726
Spain - - - - -	1,242	1,011
Italy - - - - -	1,106	925

NOTE.—The proportions in this table for foreign countries are taken from “Die Verbreitung der Blindheit, &c., in Bayern.” By Dr. G. Mayr, 1877, p. 100.

The proportion of the blind to the population of the same time of life in England and Wales increases rapidly in the successive age-periods, as is shown in the following table; and at each age-period, excepting the last, the male proportion is considerably higher than the female. That the female rate is exceptionally higher than the male in the last age-period, 65 years and upwards, is to be explained, at any rate in part, by there being many more extremely old persons, say of 85 years and upwards, among the females than among the males. The apparent irregularity in the series of rates would probably disappear were it possible to subdivide this age-period into smaller sub-periods.\*

## BLIND PER MILLION OF CORRESPONDING AGES.

Age-period.	1881.			1871.		
	PERSONS.	Males.	Females.	PERSONS.	Males.	Females.
0— - - -	166	172	161	185	189	180
5— - - -	288	312	263	306	345	267
15— - - -	388	449	328	404	451	358
20— - - -	422	491	359	451	518	390
25— - - -	641	800	494	680	871	506
45— - - -	1,625	1,947	1,336	1,720	2,002	1,459
65 and upwards	6,915	6,897	6,929	7,354	7,245	7,446
All ages - -	879	953	809	951	1,029	876

\* The mode in which the facts were abstracted in 1871 enables us to break up the age-period, 65 and upwards, into two sub-periods, 65 to 85,

Among the 22,832 blind persons enumerated were 1,958 who, according to the returns, had been "blind from birth." This term, however, must be interpreted as including not only those who literally answered such description, but those also who had lost their sight at a very early period of life; for it appears to be an excessively rare thing for an infant to be actually blind at the time of birth. It has been thought well to give a separate account (Summary Table 18) of these persons who either never saw or lost their sight before their education began, because it is a matter of some interest to know what occupations are open to persons thus heavily weighted in the race of life. Here and there a person thus afflicted, compensating the want of vision by increased attention to the indications of the other senses, learns to follow occupations that at first seem incompatible with his or her condition. One such man, for instance, was returned as ostler in an inn, and another as engaged in sea fishing.\* But, putting such exceptional cases aside, the occupations open to those who have been blind from infancy are very few. Among such of these blind as were 15 years of age and upwards, only 51 per cent. of the males and 19 per cent. of the females were returned as following any definite occupation, whereas out of the whole population of England and Wales of the corresponding age the proportion occupied was 94 per cent. for males and 37 per cent. for females. Of the 436 with definite occupations, 110 were musicians, including seven piano-tuners; basket-making gave employment to 95, brush and broom making to 25, mat-making to 23, and chair-caning to 14; the knitting of stockings or other hosiery occupied 44 persons, all women; 19 were agricultural or general labourers, and 18 were street hawkers, leaving only 88 engaged in all other specified occupations.

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and 85 and upwards. The male blind-rate was 6,812 in the earlier sub-period, while the female rate was only 6,687. But in the later sub-period, 85 and upwards, the female rate was 25,810, and far above the male rate, which was 21,450. It would therefore appear that in very advanced life women are more likely than males to become blind.

\* Special inquiry was made in each of these cases as to the accuracy of the return.



OCCUPATIONS OF MALES AND FEMALES RETURNED AS BLIND  
FROM BIRTH.

TOTAL:—MALES, 981; FEMALES, 977.

I. PROFESSIONAL CLASS.		V. INDUSTRIAL CLASS—(cont.)	
	M. F.		M. F.
Civil Service (letter carrier) ...	1 —	Innkeeper ...	1 —
Town Crier ...	2 —	Greengrocer, Fruiterer ...	3 —
Nonconformist Minister ...	1 —	Tea Dealer ...	1 —
Missionary, Scripture Reader ...	3 —	Flax Reeler ...	— 1
Schoolmistress ...	— 3	Cocoa Fibre Manufacturer ...	4 —
Teacher ...	1 5	Sash Line Maker ...	— 1
Musician, Music Master ...	82 21	Mat Maker ...	23 —
Piano Tuner ...	7 —	Net Maker ...	1 —
Organ Blower ...	1 —	Weaver ...	— 1
II. DOMESTIC CLASS.		Knitter (Hosiery, Fancy Goods) ...	— 44
Domestic Servant ...	2 9	Dressmaker ...	— 2
Charwoman ...	— 1	Shirtmaker, Seamstress ...	— 1
Washerwoman ...	— 4	Haberdasher ...	1 —
Shoeblick ...	1 —	Shoemaker ...	2 —
Night-caller ...	2 —	Patten, Clog Maker ...	1 —
III. COMMERCIAL CLASS.		Brush and Broom Maker ...	19 6
Messenger, Porter (neither Rail- way nor Government) ...	2 —	Basket Maker ...	89 6
IV. AGRICULTURAL CLASS.		Chair-canon ...	3 11
Farmer ...	— 2	Sawyer ...	2 —
Agricultural Labourer ...	7 —	Wood Worker ...	1 —
Horse Proprietor ...	1 —	Coal Miner ...	6 —
Ostler ...	1 —	Ironstone Miner ...	1 —
Fisherman ...	1 —	Miner (undefined) ...	1 —
V. INDUSTRIAL CLASS.		Coal Dealer ...	1 —
Newsroom Agent, Newsroom Keeper ...	4 —	Iron Manufacturer ...	2 —
Cutler ...	1 —	Coppersmith ...	1 —
Carpenter ...	1 —	General Shopkeeper ...	2 —
Upholsterer ...	1 —	Costermonger, Huckster, Street Seller ...	15 3
Mattress Maker ...	1 —	General Labourer ...	12 —
		VI. UNOCCUPIED CLASS.	
		Persons returned by Property, Rank, &c., and not by special occupation, includ- ing all children under five years of age... ..	
		666 856	

OPHTHALMOLOGICAL SOCIETY OF THE  
UNITED KINGDOM.

THURSDAY, JANUARY 10TH, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

REPORTED BY DAWSON WILLIAMS, M.D.

*Congenital Absence of Lacrymation on one Side.*—Mr. Stan-  
ford Morton showed a child in whom the secretion of tears  
was wanting on the right side.

*Hæmorrhage in the Sheath of the Optic Nerves.*—Mr. A. Q.  
Silcock showed preparations of the optic nerves of a man who

died in St. Mary's Hospital eight days after fracture of the skull. Whilst in the hospital he was delirious, and no ophthalmoscopic examination was made. A fissured fracture traversed the posterior inferior angle of the right parietal bone, and the right half of the occipital; the middle and anterior fossæ were intact. There was much extravasated blood in the cavity of the arachnoid, especially over the base of the brain. The sheath of the left optic nerve was distended and discoloured near the eyeball from extravasation of blood into it; the sheath of the right nerve also contained blood, but to a less degree. Microscopic examination showed that the nerve was inflamed, and that the blood was confined to the sub-dural space; the optic disc was swollen. Berlin had stated that such extravasation was found only when the fracture involved the optic foramen (Graefe-Saemisch, vol. vi, p. 620); but here the foramen was intact. If the optic nerves were systematically examined in cases of cerebral hæmorrhage, an extension of the blood into the sheath would probably be found to be not uncommon. (*Vide* also O. R., Jan. 1884, p. 28.)

*Symmetrical Disease in the Region of the Yellow Spot.*—Mr. Waren Tay had previously exhibited to the Society two similar cases. The present patient was the third child of the same parents, and all the three children had presented the same peculiar changes in the region of the yellow spot. This child, when six weeks old, was brought to the London Hospital with well-marked optic neuritis, without change at the yellow spot; and again when six months old, with degenerative changes in the yellow spot, and optic atrophy, precisely as in the elder members of the family; the changes were symmetrical in the two eyes. Mr. Tay could advance no theory to account for the disease; he did not think the idea of embolism was tenable. The three patients were the only children of the parents, and were all males.

The President observed that the symmetry of the changes militated against the idea of embolism. The cases were, perhaps, instances of a peculiar class, not congenital, but due to congenital delicacy of organisation, in which the affected organ—the optic nerve in these cases, the skin in Kaposi's disease (*xeroderma pigmentosum*)—could not endure the ordinary wear and tear of life.

*Mucopurulent Conjunctivitis of Sympathetic Origin.*—Dr. Brailey showed a man, aged 66, whose *right* eye had been injured about sixteen months earlier, and excised on November 29th. The *left* began to discharge soon after the accident, and there was still a considerable gummy discharge. It was no better after excision of the right eye, but rather worse.

Dr. Story thought it easier to believe the occurrence of the conjunctivitis a coincidence than a sympathetic accident.

Mr. Adams Frost failed to understand the grounds upon which Dr. Brailey thought the case sympathetic. Was it especially obstinate to treatment? Did he regard the fact that the conjunctival affection was not improved by enucleation as evidence of its sympathetic character?

Mr. Nettleship inquired what treatment had been applied to the eye at first; if it had been treated with atropine, and covered up with a handkerchief, it seemed possible that a chronic conjunctivitis might have been fomented into an acute attack.

Dr. Brailey said that he regarded the conjunctivitis as sympathetic because the eye had previously been sound, because the inflammation had resisted all treatment, and because it had become worse after excision of the fellow eye. It was true that the patient had a high degree of hypermetropia, but vision was very good with spectacles. It was his impression that conjunctivitis was at least as common as other forms of sympathetic inflammation.

*Congenital Malformation of Pupil.*—Dr. Beevor showed a boy, aged 9 years, under treatment for epilepsy, in whose left eye the pupillary aperture was double, both apertures reacting to light and in accommodation. With the normal eye the patient read Snellen  $1\frac{1}{2}$ , with the left eye Snellen 3. There was no history of syphilis, and there was no evidence to connect the anomaly with a persistent pupillary membrane.

*Case of Pseudo-glioma in a Child aged Two Years.*—Mr. Lewis Jones related the case of an infant who had a fall, and two days later was convulsed, with fever, squint, vomiting, and retraction of head. Four days later there was acute iritis in the right eye, and optic neuritis in the left eye. At the end of three weeks

the fever left the patient, but a yellowish-white reflex was seen in the right eye, and the tension of the eye was found to be much diminished.

*Adjourned Discussion on Sympathetic Ophthalmitis.*—Mr. Spencer Watson said that keratitis punctata had been spoken of as very common. He was familiar with it in syphilis, in rheumatism, and in cases quite apart from any cachexia, but he had not seen it in sympathetic ophthalmia. The definition of sympathetic ophthalmitis was not sufficiently precise. In glaucoma, where the operation of iridectomy in one eye was followed by glaucoma in the other, the affection of the second eye was probably due to the same primary cause as in the first eye, rather than to any effect produced by the operation.

Dr. Brailey, being requested to recapitulate the views expressed by him at the previous meeting, said that dots on the posterior surface of the cornea were uncommon in syphilitic iritis, and still more so in rheumatic affections. In sympathetic ophthalmitis, on the contrary, he had only once failed to find them. Mr. Milles, in a large experience at the Moorfields Hospital, had never failed to find them. They were not, however, present throughout the whole course of the cases, and might escape observation if a case were only watched for a short time. He believed that there was a sympathetic conjunctivitis, and also a sympathetic neuritis leading to optic atrophy. He thought that the theory of direct transmission of inflammation from the one eye to the other was not tenable, and that the old theory of reflex nervous irritation must be reinstated. The occurrence of injection of the conjunctiva on the opposite side, after wounds of the eye, was common and generally recognised; it did not seem unreasonable to suppose that this injection might run on to inflammation. Nervous irritation might impair the function of the cerebral centre controlling the nutrition of the eyes. The occurrence of sympathetic inflammation long after enucleation was opposed to the idea of its being a result of direct transmission, or immediately determined by reflex irritation. On the other hand, assuming that the nutrition of the second eye was impaired by irritation of the nutrition-centre, this eye might remain liable to be attacked by disease. In reply to the enquiry as to what he would include within the term sympathetic

ophthalmia, he said that if the ordinary liability of a healthy eye to any given disease were as one in a thousand, and if in an eye, the fellow of which was affected, it was one in a hundred, then he would regard the occurrence of the disease in the latter case as due to sympathetic action.

Dr. Story could not accept Dr. Brailey's theory of sympathetic ophthalmitis. Inflammation of a distinct area had never been produced by experimental irritation of a nerve. Further, sympathetic irido-choroiditis was peculiar in character, and ran a course differing much from that of ordinary iritis and choroiditis, a fact difficult to account for on the theory of reflex nervous irritation. Again, if it were due to that cause, he should expect that the excision of the irritating eye would have more effect than it commonly has. It was true that injection of the conjunctiva did occur, but it was not safe to assume that it would run on to inflammation; congestion and hyperæmia due to nervous disturbance were not commonly observed to pass on to inflammation.

Mr. Adams Frost protested against Dr. Brailey's statement that there was no line of demarcation between hyperæmia of the conjunctiva and a muco-purulent conjunctivitis such as was present in the case last read. In the former case there was merely excess of normal secretion; in the latter there was exudation of leucocytes, and the formation of an abnormal secretion. He considered the cases in which sympathetic ophthalmitis came on subsequently to the enucleation of the injured eye to be more consistent with the theory of a morbid change slowly extending by continuity of tissue from one eye to the other, than with that of a reflex irritation. He was surprised that Dr. Brailey regarded the aggravation of the conjunctivitis immediately after the enucleation as evidence of its being sympathetic; to most people it would appear that an immediate amelioration in the condition of the eye would have pointed in this direction, but that the absence of improvement, if of any value at all, was evidence of its not being of sympathetic origin.

Mr. Nettleship thought that the evidence with regard to the sympathetic conjunctivitis was insufficient, and that the doctrine that such a condition was commonly to be recognised had not been proved. If Dr. Brailey had cases which proved its occurrence,

he hoped they would be published. He regarded the inflammation of the disc, which occurs in an early stage of sympathetic ophthalmitis, as altogether different from ordinary papillitis, and from the neuritis leading to atrophy. The papillitis, in sympathetic affections, was a part of a general inflammation of the eyeball; if there was any evidence that it occurred independently of general inflammation, it should be put on record, and the same remark applied to the subject of keratitis. He thought the position of those who denied that inflammation travelled from one eye to another along the nerves was not assured, because the examination of the nerves involved—the ciliary nerves, for instance—was difficult, and could seldom be completely carried out, owing to the very short length of nerve which was removed with the diseased eye when that was enucleated. In optic neuritis with intracranial tumour, it was long a matter of dispute whether the inflammation extended by continuity, though the doctrine was now generally accepted. If so much difficulty had been encountered in obtaining a proof, in the case of a large nerve, like the optic nerve, what wonder that it still remained insurmountable in the case of the ciliary nerves.

Mr. Waren Tay inquired whether any member had seen a recovery of sight in cases where punctate deposits formed within the lens.

Mr. J. B. Lawford thought it difficult to say why, if sympathetic inflammation spread along the nerves, it did not extend to other structures, the meninges and centres for example.

Mr. M. McHardy referred to a case published by him in the *St. George's Hospital Reports*, where conjunctivitis came on three weeks after removal of the damaged eye, spread in spite of treatment, and eventually developed into typical sympathetic ophthalmitis. The cases of definite typical serous iritis with punctations which he had seen had almost all occurred in women, either about the climacteric period, or in association with some uterine derangement.

The President confirmed this observation of Mr. McHardy's. There was in women a very remarkable and very obstinate keratitis punctata, occurring in both eyes, quite apart from gout, rheumatism, or syphilis. He thought that it might,



perhaps, be possible to recognise in the future a class of cases of neurotic ophthalmitis resembling sympathetic ophthalmitis in symptoms and course, but not dependent on any sympathetic cause; perhaps some forms of the rheumatic inflammation were of this nature.

*Cystoid Cicatrix.*—Mr. Story read a paper on the treatment of cystoid cicatrix; he advocated the use of nitrate of silver. In one cystoid cicatrix of five millimètres diameter, occurring after a cataract-extraction, he cauterised about a dozen times in the course of a month, having previously split open the cyst with a Gräfsian knife. The cure was perfect, and so far permanent. He agreed with von Gräfe in assigning a very small opening for the communication between the cyst and the anterior chamber, and suggested that in some cases no communication existed. In the case treated by him, no effect was produced on the anterior chamber by the escape of the fluid from the cyst. He had found, as von Gräfe stated, that the tension was generally subnormal in these eyeballs, and that hernia iridis was a frequent forerunner of cystoid cicatrix, but the hernia was not to be regarded as either the cause or the first stage in the growth of the cyst. The eye tolerated the solid nitrate of silver perfectly, vaseline being applied to prevent the effects of the caustic from spreading too far. The actual cautery might probably be used with equally good results.

*A Case of Paralysis of Convergence and Accommodation.*—Mr. Eales described the case of a little girl, aged 13 years, who came under his care on June 1st last, suffering from complete suppression of all power to converge the eyes, together with paralysis of accommodation and the associated contraction of the iris in each eye, though the pupils reacted well to light. It appeared that this condition began in March last. The patient had never menstruated, had always had good health, having suffered from no illnesses except the usual complaints of childhood, and a mild attack of typhoid fever, uncomplicated by relapses or sequelæ, and none of them related in point of time with the occurrence of the ocular affection. Her mother died of tubercular phthisis. Her father was a subject of gout. There was no evidence or suspicion of syphilis, or of diphtheria, no history of headache or vomiting. The

patient was spare, and slight, but apparently a healthy and cheerful child. On examination, the bilateral movements of the eyes in all directions, except convergence, appeared to be normal. The disc and fundus of each eye was healthy. Acuity of vision was good in each eye (Vision— $\frac{1}{1\frac{1}{2}}$ ). The field of vision was normal, and colour-vision good. There was no other evidence of organic nervous disease. Patellar tendon-reflex was normal. There was no evidence of anæmia. Treatment by strychnia and potassii iodidi had no effect on the ocular condition, which persisted to the present time. In the absence of any evidence of coarse intracranial disease, the symptoms might be attributed to a degenerative change in those nuclei of the third nerve which had been shown by Hensen and Völckers to preside over the functions lost, and to be situated in the neighbourhood of the aqueduct of Sylvius; but what had caused this degeneration there was no evidence to show.

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# SEVERE RETINAL HÆMORRHAGE AT THE YELLOW SPOT, SYMMETRICAL IN THE TWO EYES, IN A CASE OF SIMPLE CHRONIC ANÆMIA.

BY HENRY EALES,

SURGEON TO THE BIRMINGHAM AND MIDLAND EYE HOSPITAL AND  
DEMONSTRATOR OF ANATOMY AT QUEEN'S COLLEGE.

Annie B., aged 21, married two months, was admitted on October 18th, complaining that during the past fortnight her sight had failed, and expressing a desire to obtain glasses to enable her to read, etc. She was evidently affected profoundly by anæmia, the lips and gums being almost colourless, and the finger nails and skin generally intensely pallid, though she "considered her health good."

On enquiry it was elicited that she had not menstruated regularly for the past three years or more, and not at all for the past ten months. She often did not menstruate for two or three months, and then lost very little, and this was both pale and scanty. She had never had any illness in her life that she could recollect. She was habitually constipated.

Her sight failed her suddenly on October the 4th, after hurrying up a flight of steps to catch a train.

Dr. Saundby was kind enough, at my request, to examine the patient for me, and reported as follows:—Pulse, 120 per minute; systolic murmur in the left second interspace; first sound at the apex reduplicated; bruit-du-diable over jugular veins; systolic murmur over both eyes; area of dullness of spleen and liver normal; blood under the microscope shows great increase of white corpuscles; red corpuscles deformed, pale, and do not form rouleaux.

On ophthalmoscopic examination I found a considerable hypermetropic astigmatism; the fundus of each eye was strikingly pale; the retinal arteries were small in comparison with the veins, themselves abnormally small; the vessels were so pale as to appear quite transparent, while there was not the difference in the degree of colour usually noticed between the

arteries and veins; there were several small flame-shaped hæmorrhages, mostly near the disc. The yellow spot was entirely obscured in each eye by a large, dark, purple-coloured hæmorrhage, quite circumscribed, somewhat larger than the optic disc, and of a pyriform shape, with the tail reaching in a curved direction upwards and inwards till it terminated at the outer of the two ascending branches of the retinal artery, not far from the disc. In the centre of its head, which corresponded to the position of the yellow spot, there was a small ill-defined area of a yellowish white colour. This appearance was precisely similar in each eye. The discs were not blurred.

On testing her vision, it was found that the patient could not tell any of Snellen's types at 15 feet (V not equal to  $\frac{1.5}{2000}$ ). She complained of an obvious large central scotoma in each eye.

*Treatment.*—She was treated by purgatives, daily at first, later not so often; ferri sulph., or liq. ferri perchlor., internally three times a day; a liberal, but light diet; for dinner she had, daily, meat, minced, pounded, and warmed, but not cooked. Under this treatment she rapidly began to improve in all respects, and speedily became restored to health.

*November 26.*—She was discharged, all signs of anæmia having disappeared, and she having menstruated normally since her admission into the Hospital. With the exception of the yellowish area in the centre of the yellow spot region before alluded to, the fundus of each eye now appeared normal, all trace of the hæmorrhages having entirely disappeared. She stated that “she could now see as well as she had ever done in her recollection.”

I am indebted to our House Surgeon, Dr. White, for a note as to the refraction and acuity of vision at this date, which he found to be as follows:—

<i>Right eye</i>	H <sup>c</sup> Astig. $\frac{1}{11}$ ;	this being corrected, V = $\frac{20}{70}$
<i>Left eye</i>	Hm. $\frac{1}{30}$ and H <sup>c</sup> Astig. $\frac{1}{11}$ ;	„ V = $\frac{20}{40}$

All writers agree that whereas retinal hæmorrhages are common in the graver forms of anæmia, they are rarely found in the simple chronic anæmia of young women. This, and the remarkable symmetry of the hæmorrhage into the yellow spot region in each eye,

followed by good recovery of central vision, seem to me to justify the publication of this case. It is not improbable, bearing in mind the degree of astigmatism present, that the patient's assertion, that her sight is "as good as ever," may actually be correct.

Dr. Stephen Mackenzie, in a paper read recently before the Ophthalmological Society, giving the result of careful observations on a series of cases of acute anæmia caused by hæmatemesis, etc. (*vide* O. R., Jan., 1884, p. 25), stated that he had found that when the corpuscles were reduced 50 per cent., or more, below the normal standard, retinal hæmorrhages were prone to occur, and expressed the opinion that a reduction below 50 per cent. would probably be found in all forms of anæmia to coincide with a tendency to retinal and other hæmorrhages.

We have the authority, however, of Dr. Gowers (Medical Ophthalmoscopy) that in simple chronic anæmia retinal hæmorrhages are "very rare," and "probably only take place where there is a great absolute deficiency in the number of red corpuscles," he having found them absent in a case in which the "corpuscles were only 26 per cent. of the normal;" while, on the other hand, he says, "The tendency to retinal hæmorrhage is apparently far greater in leucocythæmia than in simple anæmia, for it occurs with a percentage of red corpuscles greater than is usual in the cases of simple anæmia, which present retinal hæmorrhages. I have twice met with them in leucocythæmia, when the blood contained 50 per cent. of red corpuscles." So that while we are probably justified in looking at a reduction of corpuscles below 50 per cent. as a condition of things likely to predispose to retinal and other hæmorrhages, we are hardly justified in considering a reduction of corpuscles as the only element in the causation, or as being equally grave in all forms of anæmia. Dr. Gowers has shown also that optic neuritis "occasionally occurs in chlorotic girls," and seems to imply that it is specially related to a

reduction of the hæmoglobin, for in referring to two cases which came under his care he says, "In each case the anæmia was very great, the hæmoglobin being reduced out of proportion to the corpuscles, in one to 30, and in the other to 38 per cent."

I regret that no attempt was made in my case to estimate the percentage of either the corpuscles or the hæmoglobin, so that it throws no light on the points alluded to.

In the "Ophthalmic Review" for September, 1882, I published the results of a careful ophthalmoscopic examination of the eyes in 50 chlorotic girls, sent to me by Dr. Saundby, which seemed to indicate that slight changes in the fundus oculi occur in a larger percentage of these cases than is generally supposed. The present case illustrates the possibility of even grave retinal hæmorrhage in this too common affection, and seems a fitting addition to the facts therein recorded.

## CENTRAL SCOTOMA FROM EXPOSURE TO THE DIRECT RAYS OF THE SUN.

BY SIMEON SNELL,

OPHTHALMIC SURGEON TO THE SHEFFIELD GENERAL INFIRMARY  
AND TO THE SCHOOL FOR THE BLIND.

Since the notice of Deutschmann's article on "Blinding of the Retina by direct sunlight" in the "Ophthalmic Review" of last year (p. 109), interesting cases bearing on this subject have been published in its pages by Swanzy and Little, as well as a marked case of Retinitis by myself. The following case will add another to the series already recorded. It will be found to present features similar in some respects to those of Mr. Swanzy's first case. In connection with the absence of ophthalmoscopic signs, it must be borne in mind that a period of about seven weeks elapsed between the time of the exposure to the sun and that of the examination.

In the early part of September (6th or 7th), 1883, a youth, aged about 17, was looking at the heavens through a powerful telescope, when, in shifting the instrument, he received the full blaze of the sun directly on the right eye, which he was using. The glare of light was only momentary, but to use his own expression he felt the "eye gone"; it commenced to water, and he had to close the eyelids to shut out, as it were, the intense light. After a time, he recovered, as he fancied, but on returning to his studies at a college in the neighbourhood of Sheffield, on September 13th, he noticed, whilst reading especially, a "dot" constantly in front of the right eye.

On October 25th he came to consult me. He complained of difficulty in getting on with his studies, as the black mark referred to was always before him. He described the "dot" as being about the size of a tolerably big pin's head, with a faint line running on either side from it. The ophthalmoscope disclosed no changes in the fundus oculi. A myopia of 1.5D being corrected, vision equalled  $\frac{6}{6}$ . In the left eye vision equalled  $\frac{6}{6}$ , but was slightly improved by a weak minus glass. It was found impossible to map out the scotoma on the black board on account, presumably, of its extremely small size. The patient stated, that when he looked at a straight object, such as a pencil, it appeared to become thicker at the point on which he fixed his attention.

Except once or twice, at about the date given, I have not again seen the patient.

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## CASES OF INJURIES TO, AND FOREIGN BODIES IN, THE EYE.

UNDER THE CARE OF MR. SNELL, SHEFFIELD  
GENERAL INFIRMARY.

(*The Notes of Cases by Mr. Priestley.*)

*Direct Injury to the Optic and Sixth Nerves.*—James A., aged 27, a mason, was engaged on March 2nd, 1883, in digging up a road, when a fellow-workman accidentally struck him in the left eye with his pickaxe. He states that sight was immediately lost. His wounds were attended to by a medical man, and he did not come to the Infirmary until March 6th.



There was then some swelling of the left eyelids, and a large wound of the conjunctiva at the inner and upper side, which had been sutured. It was evident thus that the pick after injuring the upper eyelid had severed the conjunctiva and entered the orbital cavity between the superior and internal recti. Vision was found to be quite lost, there being no perception of light. The pupil acted only with its fellow. The external rectus possessed little, if any, power. The eyeball could not be turned outwards. Other movements were good. The optic disc was whiter than normal, presenting a marked contrast to the one in the opposite eye. The patient attended for a while and then disappeared. February 1st, 1884.—He came at request to-day. The optic disc is white and atrophied, and there is no return of vision. He is able to move the eyeball outwards fairly well; he says the power of movement has returned gradually, but particularly during the last two months.

In this case there was clearly a direct injury to the optic nerve. Whether the pick at the same time singled out the sixth nerve and thus impaired the outward movement of the eye, or whether this restriction was due simply to the puckering of the wounded tissues on the inner side of the globe, is difficult to decide. The loss of movements outwards was at first almost complete; it seemed to be too great to be caused otherwise than by injury of the nerve or possibly of the muscle.

*Rupture of the Iris and Injury of the Choroid from a Blow on the Eye.*—Edwin C., aged 13, was struck on the right eye by a stone on the evening of February 13th, 1883. He came to the Infirmary on February 15th. There was then ecchymosis of the right eyelids, a contused wound on the lower eyelid, and some swelling of the conjunctiva. The pupillary edge of the iris was ruptured at the upper and inner part, the rent reaching nearly to the periphery and forming a V shaped gap of tolerably large size, with its base towards the pupil. There was no external injury to the cornea. No record was made of the ophthalmoscopic appearances beyond a note of "slight rupture of choroid, and some disturbance round nerve entrance." Vision = fingers.

February 1st, 1884.--The patient was seen to-day. Vision has improved;  $V = \frac{6}{36}$ , and he reads at eight to ten inches. Around disc are several patches of pigment, and on the macula side is a tolerably large area of choroidal thinning, this lighter surface being marked off clearly from the surrounding deeper coloured portion of the fundus; scattered on this surface are dots of pigment. There is no white crescentic patch, such as rupture of the choroid usually causes. The optic disc is whiter than that of the sound eye.

*Piece of Bone Embedded in the Iris for Ten Years.*—Colville J. A., aged 13, was brought to the Infirmary in the latter half 1882. The history obtained was that when about three years of age he was striking a needle with a hammer, on a bench upon which were some bone raspings, when a piece of bone flew up and struck the left eye. A medical man to whom the boy was taken explained to the parents the nature of the accident, and advised that the fragment should not be removed. The eye had remained quiet to within a few days of his coming to the Infirmary; since then it had been irritable. There was a slight injection of the ocular surface, which disappeared in a few days with the use of atropine. The pupil dilated perfectly with the mydriatic. In the iris, just above the upper pupillary margin, was a brownish-yellow elevation, about the size of a large pin's head. No mark of entrance of the foreign body was detected. Vision was perfect. No operation for the removal of the fragment of bone was advised.

*Fragment of Steel in Lens for Twenty-four Years.*—Robert P., an engineer, aged 52, came as an outpatient to the Infirmary on May 21st, 1880. Twenty-four years ago he was working at an anvil with a "swager," when a chip from the tool flew off and entered the left eye. He was seen by a medical man. The foreign body was not extracted. Traumatic cataract appears to have formed, and vision to have been nearly lost. He can now count fingers, and says that the sight is as good as it has been since the accident. The pupil dilates well with atropine. The lens is opaque and shrivelled, and has undergone some degree of absorption. A splinter of steel is visible embedded in the centre of the lens. The eye has never troubled him

much except during the three weeks immediately succeeding the accident. The patient was unwilling to have the cataractous lens removed, and only attended at the Infirmary on the one occasion mentioned. It is quite probable that when the patient was seen soon after the accident the opacity of the lens hid the foreign body from view, and that it was the subsequent absorption which made it visible.

*Piece of Steel in Lens for Fifteen Years without producing Cataract.*—Whilst preparing the foregoing cases for publication, a joiner, aged 40, employed at the Sheffield General Infirmary, asked my opinion respecting his left eye. Examination disclosed a small localised opacity in the lens. On enquiry as to past injuries, it was elicited that fifteen years previously he was struck on his eye by a piece of steel. He was taking a hinge off a door, and whilst striking with a hammer a chisel with which he was prising the hinge, a splinter from the chisel hit the left eye. The pupil having been dilated with homatropine, a further examination showed that the opacity must be a foreign body. It was situated at the upper and inner part of the lens, about midway between its anterior and posterior surfaces. The size appeared to be about that of a large pin's head; it had a whitish coating, but showed in some directions a faint metallic lustre. Careful examination disclosed a very faint linear scar in the centre of the cornea and another in the anterior lens capsule. Otherwise all the structures of the eye were normal.  $V = \frac{20}{50}$ . The patient states that sight is just the same now as it has been ever since the accident. He still had the chisel from which the splinter had flown, and it was found on examination that the body in the lens corresponded apparently in size with the defect pointed out in the tool.

The last two cases are of interest from the length of time which a foreign body had remained in the lens. In the first, cataract formed, as in the great majority of such injuries; the second is exceptional as being an instance of a splinter of metal entering the lens and becoming encapsuled, but not leading to general opacity of the lens, in consequence of perhaps immediate closure of the wound in the capsule.

M. A. STARR (New York). The Visual Area in the Brain determined by a Study of Hemianopia. *Amer. Jour. of Med. Sci.*, Jan., 1884, p. 65.

This article presents a comprehensive and much needed review of all the evidence which has been recently accumulating concerning the course of the optic nerve-fibres in the brain, and the position of the visual centres. The author maintains that anatomical research, physiological experiment, and pathological observation all unite in localising the function of sight in the occipital lobes, the right lobe receiving impressions from the right halves of both eyes, the left lobe from the left halves of both eyes, and, further, that at whatever point behind the optic commissure a lesion involves the optic fibres, partial blindness of *both* eyes, and not blindness of the *opposite* eye, is the result.

The optic nerve fibres undergo a semi-decussation at the chiasm. The tracts, beginning at the chiasm, terminate in the corpora geniculata in the posterior *outer* third of the optic thalamus (the pulvinar), and in the corpora quadrigemina. The existence of fibres from the tract to the pons and olivary body is still under examination. Wernicke has lately proved the connection of the central ganglia with the cortex by a white band of fibres passing outward from the thalamus, and backward to the occipital lobe; this discovery is confirmed by Stilling and Wilbrand, and corroborates the earlier statements of Gratiolet and Meynert. Anatomically, therefore, we can now trace the course of the optic fibres from the chiasm to the occipital lobes.

Pathological observations confirm the dictum of the anatomists in two ways. Firstly, by showing that blindness of long duration is associated with atrophy of the occipital lobes: in a case reported by Hugnenin the left eye had been blind for 50 years, and both occipital lobes were found to be atrophied, thus establishing an anatomical connection between the one eye and the two sides of the brain; again, several cases of atrophy of both occipital lobes, after total blindness of long duration, are on record. Secondly, by the characteristic phenomena of hemianopia.

Homonymous hemianopia was long thought to be due in every case to lesion of one optic tract, and, prior to five years

ago, all the recorded cases supported this idea. A large number of more recent cases prove that it may also be produced by lesions beyond the tract. From these latter the author has selected those only in which the nature and position of the lesion were determined by an autopsy. He arranges them under two groups. Group 1 contains five well-marked cases of hemianopia with lesion of one optic thalamus. Group 2 presents twenty-six cases of hemianopia with lesion of one occipital lobe. Cases of hemianopia produced by lesions of the tract are well established, and are therefore not cited here ; for recent cases the reader is referred to von Graefe's Archiv., xxviii., part 2.

From an analysis of the cases cited the author arrives at the following conclusions :—Lateral homonymous hemianopia may be produced not only by a lesion of one optic tract, but also by a lesion situated either in the pulvinar of one optic thalamus ; in the posterior part of one internal capsule or its radiation backwards to the occipital lobe ; in the medullary portion of the occipital lobe ; or in the cortex of the occipital lobe. Thus a lesion in the course of the optic fibres of one side, at any point between the optic chiasm and their termination in the cortex of the occipital region, produces homonymous hemianopia, the occipital lobe of each side being in anatomical and functional relation with the like-named retinal halves of both eyes.

Seeing that these conclusions conflict with Charcot's doctrine of crossed amblyopia, and with Ferrier's statement that the angular gyrus is the centre for sight in man, the author proceeds to investigate the evidence on which these theories rest.

Charcot's scheme, in which all the fibres from one retina ultimately meet in the hemisphere of the opposite side, was proposed to explain the symptom of crossed amblyopia (*i.e.*, partial blindness in the eye opposite the lesion) observed in cases of hysterical hemianæsthesia ; it was not based upon any post-mortem observation. Landolt investigated the cases in question, and showed that there were defects in both eyes instead of in one only. Charcot himself appears to have abandoned the scheme, for his pupil Féré has recently proposed a different one which is incompatible with the idea of a crossed amblyopia.

Grasset, on the other hand, still more recently has reasserted the doctrine of crossed amblyopia, and put forward a new hypothetical scheme by which to reconcile its supposed occurrence with the well-established fact of hemianopia from cortical lesion. Grasset's scheme is a highly artificial one (*vide* O. R., vol. ii., p. 332), and could only be accepted as a reasonable hypothesis, provided there were convincing evidence of a true crossed amblyopia, but this Starr declares to be not the case. Grasset claims that there are several cases on record in which an autopsy has shown that a lesion of one hemisphere, in the internal capsule, may produce blindness in the opposite eye. He cites four cases. But in only one of these did the eye in question appear to be blind, and in this case there was a defect of vision in the other eye also; in the other three there was only a diminution of visual power, and in one of these again the other eye was affected also. This criticism does not, however, cover the whole question at issue. Starr may be justified in saying, with Mauthner, that "there is no case well authenticated in which lesion of one hemisphere has produced blindness in the opposite eye," but he offers no explanation of the fact that concentric contraction of the field, with diminution of central acuity, *i.e.*, a visual defect *not* of a hemianopic character, *does* occur in association with hemianæsthesia and other signs of one-sided cerebral disturbance. (*Vide* cases observed by Ferrier and Hughlings Jackson, with charts of the fields: *Brain*, 1881, p. 459). In some cases of general nerve-impairment a precisely similar visual trouble is certainly due to retinal failure. Is it possible in *all* cases to refer concentric contractions of the field to the retina? (*Vide* O. R., February, 1884, p. 45.)

The author next proceeds to examine the statements of Ferrier. By the kindness of Dr. Ferrier we are able, in the following passage, to state concisely the results of his latest observations and the conclusions he derives from them:—

Lesions of the occipito-angular region (occipital lobes and angular gyri) cause affection of vision, without affection of the other sensory faculties or motor powers.

The only lesion which causes complete and permanent loss of vision in both eyes is total destruction of the occipital lobes and angular gyri on both sides.



Complete extirpation of both angular gyri causes for a time total blindness, succeeded by lasting visual defect in both eyes.

Unilateral destruction of the cortex of the angular gyrus causes temporary abolition or impairment of vision in the opposite eye—not of a hemiopic character.

Deep incisions may be made in both occipital lobes at the same time, or the greater portion of one or both occipital lobes at the same time may be removed, without any appreciable impairment of vision.

Destruction of the occipital lobe and angular gyrus on one side causes temporary amblyopia of the opposite eye and homonymous hemianopia of both eyes, towards the side opposite the lesion.

As in none of the cases recorded, either of partial, unilateral, or bilateral lesion of the occipito-angular region, were the amblyopic or hemianopic symptoms permanent, it is concluded that vision is possible with both eyes, if only portions of the visual centres remain intact on both sides.

Starr's criticism of the clinical evidence cited by Ferrier reads as follows :—"Of the four positive cases cited by him in 1878 (*Localisation of Brain Disease*, pp. 130-133) to connect the angular gyrus with vision, one was without autopsy as the patient recovered; two occurred in lunatics, and no exact determination of the limits of the field of vision was made, while the original report shows that the angular gyri *alone* were not involved, but the occipital lobes were also affected (Fürstner, *Arch. f. Psychiatrie* VIII., and IX.); and the fourth is quoted from Bastian (*Paralysis from Brain Diseases*, p. 113), who ascribes the blindness to a lesion of the optic tract and corpora quadrigemina, and *not* to the lesion of the angular gyrus. Of the three positive cases cited in 1881 (*Brain*, Jan., 1881) not one is accompanied by a record of autopsy. On the other hand, Ferrier himself gives thirteen cases in which lesion of the angular gyrus was not associated with any defect of vision. And Exner cites twenty-two cases in which sight was not affected (*Localisation, d. Gehirnk.*) . . . The result of physiological investigation on animals can only be accepted as true of man when confirmed by pathological observation." Starr suggests that Wernicke's discovery of a tract of fibres passing from the optic thalamus to the occipital lobe just beneath the angular gyrus may perhaps explain the results obtained by Ferrier, for a lesion of the gyrus, unless superficial, would probably involve this tract, and thus produce a disturbance of vision.

It is not yet possible to connect definite areas of the cortex with definite areas of the retina, as Munk was able to do in the case of dogs and monkeys, for an examination of the recorded cases shews that, in man, hemianopia may be produced by a lesion, either of the convexity, or of the median surface of the lobe. Further, it is impossible from the visual defect to determine the nature of the brain lesion. Hemianopia is produced by abscess, embolism, hæmorrhage, tumour, chronic meningitis, &c., provided the optic fibres or their centres be involved.

It is noteworthy that patients suffering from hemianopia rarely observe the character of the impairment with accuracy, but usually complain of disturbance of vision in the eye corresponding to the blind side, *i.e.*, in the eye on the side opposite to the lesion. This may be due, as Starr suggests, to the fact that, in this eye, the blinded area is much larger than in the eye on the same side as the lesion, but arises more commonly, we think, from the unreasoning assumption that darkness on the right side means blindness of the right eye, and *vice versa*. Seeing that careful examination is usually necessary to elicit the nature of the impairment, it is likely that hemianopia is often overlooked, and that some cases of the so-called crossed amblyopia might, if properly examined, prove to be hemianopia. In proof of this tendency to error the author cites a number of cases in which the lesion found must have produced hemianopia, but in which the report simply records a disturbance of vision.

In all the cases cited in this article central vision was preserved. If in hemianopia the blind area extend beyond the fixation point, or if there be an impairment of central vision, or if the field be diminished throughout its entire periphery, there must be some other change in addition to the local lesion which causes the hemianopia; such, for example, as a defect in the eye itself, or a descending neuritis. It is stated that colour-blindness is never met with in the unaffected halves of the retina.

In eight of the cases cited, hemianopia was the only permanent brain symptom. In one of these the lesion was found in the optic thalamus; in two, in the occipital lobe, but involving the thalamus; in the remainder it was confined to the occipital lobe.

In thirteen of the cases cited permanent hemiplegia accompanied the hemianopia. In all but two of these the lesion affected either the motor tract between the parietal region and the crus cerebri, or the corpus striatum. In some cases one lesion was of sufficient extent to involve both the motor and the visual tracts, where they cross in the internal capsule; in others the hemiplegia was due to an extension of the lesion from the occipital to the parietal region, or to a second lesion in the motor area. In no case was there reason to refer the paralysis to lesion of the occipital lobe.

In eight cases permanent hemianæsthesia accompanied the hemianopia, and in these the lesion involved or pressed upon the optic thalamus, or the posterior part of the internal capsule. The course of the sensory fibres in the brain above the level of the internal capsule is still unknown, but the absence of hemianæsthesia in twenty cases of lesion of the occipital lobe proves the important fact that the areas of common sensation do not lie in that part of the brain.

Aphasia was associated with right hemianopia in ten cases, and was attributable, either to an independent lesion, or to pressure upon the island of Reil, by tumour, abscess, or clot in the centrum ovale or the basal ganglia.

In the cases in which monoplegia occurred there was always found a lesion of the central convolutions in the parietal region, and the unilateral convulsions, or monospasms, indicated its seat even during life. From the foregoing it is evident that there is no reason to refer any of the brain symptoms met with, other than the hemianopia, to the region of the occipital lobes.

Does homonymous hemianopia afford a means of localising a brain lesion? Seeing that hemianopia of uniform character may be produced by a lesion lying at any point in the course of the optic fibres from the chiasm to the occipital cortex, it is only by studying the accompanying symptoms that the site of the lesion can be determined. For example, if a hemianopia be associated with hemiplegia and hemianæsthesia of the like-named side, the lesion probably lies where the visual and sensory motor tracts intersect, viz., in the internal capsule near the pulvinar of the optic thalamus; if it be associated with paralysis of the ocular muscles, with loss of smell, or with

anæsthesia of the face, the lesion is probably situated at the base of the brain, and involves the optic tract, and in this case an atrophy of the optic nerves will follow in course of time, most noticeable in the eye opposite to the lesion. Apart from these cases it would probably be impossible to locate the lesion.

The article concludes with a brief reference to cases in which inflammatory processes located in the visual area have given rise to visual hallucinations, or in which partial destruction of the occipital cortex has produced a loss of memory of objects recognised by sight—psychical blindness—a condition distinguishable from, and not associated with, actual blindness; and, finally, to cases in which total destruction of both occipital lobes has been accompanied by actual blindness of both eyes.

HASKET DERBY (Boston, U. S. A.) A Case of Sudden Amaurosis: Recovery. *Boston Med. and Surg. Journ.*, Feb. 7, 1884, p. 126.

The patient, a girl aged 15, came under notice on October 13, 1883, complaining of failure of sight of about two weeks' duration. She was an ambitious student at a public school, and had worked very hard for a year past. Her general health had ordinarily been good, with the exception of catamenial irregularity; the flow commenced at 13, and had never been present oftener than once in two months. She was large for her age, and apparently neither nervous nor imaginative. Since the foregoing spring she had, for the first time, been subject to severe headaches, not attended by nausea, extending over the whole head, lasting both day and night, materially worse during this fall. Observing that her eyes were watering and her vision blurry, she had covered her left eye, and ascertained, to her astonishment, that she could not see with the right. Since making this discovery, a fortnight ago, the left eye also had rapidly failed, and she was now unable to continue her studies.

Eyes prominent, pupils large, no abnormal appearance externally; a large, but defined and apparently non-progressive atrophic crescent around each disc; the rest of the fundus entirely normal; no isolated patches of atrophy, no change in

the circulation, no whiteness of the nerves. With 13 D concave the left eye had vision one-tenth, the visual field being not contracted. *The right eye had no perception of light*, either when tried by the mirror of the ophthalmoscope, by a lighted candle in a dark room, or exposed to the full glare of sunlight. The pupil of this eye was, however, very active, contracting and expanding under light and shade, the other eye being covered.

The honesty and simplicity of the patient were opposed to the idea of malingering, and the usual tests with prisms confirmed her statements. There were no other symptoms to encourage the diagnosis of hysterical amaurosis, no signs of general hysteria, of nervous derangement, of affections of other organs of special sense, or of local hyperæsthesia. All ophthalmoscopic indications were wanting. The ready response of the pupil to light seemed to indicate a deep-seated affection, located beyond the corpora quadrigemina.

Four days later the conditions were unchanged. In the hope that a derangement of the cerebral circulation might be connected both with the headache and the loss of sight, and might be affected by a local abstraction of blood, the artificial leech was applied to the right temple, and an ounce and a half of blood removed. Lactate of zinc was also ordered in moderate doses.

The headache, which had been continuous and severe for six months, disappeared after the cupping, and did not return. Five days later there was distinct perception of light in the right eye, and even ability to follow the motions of the hand, held close to the eye. The cupping was now repeated, and again a week later. Each eye steadily improved. October 30th, right, with — 12 D, vision four tenths; left, with — 13 D, two tenths. Both visual fields could now be taken, and were found to be normal. November 6th, right eye, vision five tenths nearly, left, four tenths; this amount of vision continued when the patient was last seen, on December 8th. In her own opinion her sight had fully returned. Her health was perfectly good, and she was wholly free from headache. Except from the high degree of myopia, and consequent imperfect vision, each eye seemed normal. She returned to school early in the present year.

None of the ordinary causes of cerebral amblyopia seem to have been active here. The termination of the case forbids the supposition of organic change at the base of the brain, of apoplexy, of a tumor, or of meningitis. There had been no suppression of urine. There was no suspicion of spinal disease. There had been, beyond the headache, no antecedent sickness. Finally, there was no ophthalmoscopic change, save the choroidal atrophy.

That the headache was in some way or other connected with the blindness seems probable, and that the sudden disappearance of the headache was due to the application of the Heurte-loup cannot reasonably be doubted. The author concludes by expressing his conviction that the artificial leech deserves a more frequent employment than it obtains.

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GALEZOWSKI (Paris). The Different Forms of Retinal Detachment and their Treatment. *Recueil d'Ophthalmologie*, November, 1883, p. 669.

The author opens his discussion of this subject by a brief statement of the theories recently advanced. Ivanoff asserted that detachment of the vitreous body invariably precedes that of the retina, the elevation of the latter being due to an out-pouring of fluid between it and the choroid. Leber advanced a new theory at the recent Ophthalmic Congress. A spontaneous rupture of the retina is, in his opinion, the starting point of the detachment. He observed a rupture in 14 out of 27 cases, and would attribute its non-discovery in the remaining cases to the impossibility of complete examination with the ophthalmoscope. The aperture in the retina permits an escape of fluid from the vitreous body into the sub-retinal space; the rupture of the retina and its separation from the choroid he attributes to traction exerted upon its inner surface by the fibrous constituents of an altered and shrinking vitreous body. Rava attributes the detachment rather to the distension of the sclera and choroid with which it is often associated, such distension and attenuation favouring the filtration of lymph from the perichoroidal space and its accumulation between the choroid and the retina. This hypothesis, however, if to a certain



extent true for cases of spontaneous detachment in myopic eyes, is inapplicable in many other cases. Boucheron, again, regards retinal detachment as the direct result of hyper-secretion of fluid by the choroidal epithelium, the usual causes of such hyper-secretion being lithiasis and rheumatism; the removal of uric acid from the system by the action of pilocarpine he holds to be the appropriate treatment. Galezowski himself insists that retinal detachment depends upon two essential factors, viz. : 1. Liquefaction of the vitreous body ; 2. A circumscribed serous inflammation of the anterior portion of the uveal tract, and especially the ciliary processes.

*Liquefaction of the vitreous is a necessary antecedent to retinal detachment.*—It does not usually extend to the whole vitreous body, but is observable sometimes in the upper and outer segment, sometimes in the lower and outer segment, sometimes in the whole external half, and sometimes in several distinct places at once. In myopic eyes the posterior part of the vitreous, especially in the neighbourhood of the papilla and macula, frequently becomes softened or liquefied, and this change favours the production of floating opacities on rupture of retinal or choroidal vessels. A minute extravasation of blood from a retinal vessel does not readily enter a healthy vitreous body, but remains external to it and undergoes absorption; but if the vitreous at the point in question be already liquefied, it readily admits the blood, and a more or less permanent floating vitreous opacity is the result. Hence the great liability of the myopic eye to these floating opacities, as compared with emmetropic and hypermetropic eye.

A serous effusion proceeding from the choroid will sometimes infiltrate the retina and simulate, to some extent, a detachment of the latter; but if the vitreous body be not already softened, no actual detachment occurs; in such a case it is only when the lapse of time has led to secondary degeneration of the vitreous, with loss of its consistence, that the infiltrated portion of the retina, losing its internal support, becomes detached and floating.

Choroidal sarcoma, in like manner, does not always in its earliest stages produce detachment of the retina, for at this period the vitreous is frequently well nourished and of normal consistence, but later, when the progress of the disease has

caused changes in the ciliary processes, the vitreous becomes liquefied, and then detachment of the retina follows.

Again, injuries of the eye, whether with or without rupture of the sclerotic, are frequently unaccompanied, in hypermetropic and emmetropic globes, by any immediate detachment of the retina ; whereas similar accidents in myopic eyes are very apt to produce it. But, even in the former case detachment often follows after the lapse of a few months, for, during the interval, the uveal tract has been damaged by continued inflammation, and the nutrition and consistence of the vitreous is impaired in consequence. As an instance in point, the author relates the case of a soldier in whom a blow upon the eye set up an acute inflammation, but caused no great loss of vision until three months later, when blindness came on suddenly, and was found to be due to a large detachment of the retina.

*A circumscribed choroido-cyclitis is the primary cause of retinal detachment.*—It is difficult to assign a cause for the outpouring of the serous fluid which is found beneath the detached portion of the membrane. Boucheron attributes it to a hyper-secretion of the choroidal epithelium, the action of which he likens to the morbid secretions from the epithelium covering the synovial membranes of the joints. Galezowski refers it, less to morbid changes in the epithelium itself, than to disturbance in the blood-vessels of the choroid—a sort of circumscribed cyclitis, or choroido-cyclitis.

When the predisposition to detachment, which a liquefied vitreous affords, is present, the actual accident may arise from various causes, namely, slight violence, such as contusions of the eye itself, or of the head, or body ; straining during vomiting, violent muscular effort of any kind ; prolonged use of the eyes on near objects ; cold, as from wind, or a chill after a hot bath, and other causes, capable of suddenly affecting the circulation in the eye.

In proof of the two propositions italicised above the author proceeds to discuss certain special forms of retinal detachment. Among 649 cases of detachment a *sarcomatous tumour* of the ciliary portion of the uveal tract was met with nine times. In these cases the nutrition of the vitreous is damaged and, sooner or later, a detachment of the retina invariably occurs. Tumours

in the posterior segment of the eye, and especially at the posterior pole, are much less apt to produce it. Galezowski met with nine cases of sarcomatous tumour in the macula region, and, so long as they were under examination, retinal detachment did not occur in one of them. In one such case the eye was enucleated for acute glaucoma; the ciliary processes were not diseased, the vitreous appeared healthy, and the retina, except where pushed forward by the tumour, was everywhere in its normal position. Intra-ocular tumours have been supposed to cause detachment of the retina by the pressure which they exert upon its external surface, but how a strictly circumscribed pressure, such as a tumour must exert, can thus effect a widespread detachment of a pliable membrane like the retina has not been explained; moreover, this hypothesis does not account for the diverse effects of tumours situated in different parts of the uveal tract. It is far more reasonable to suppose that choroidal tumours act like other causes of detachment, by inducing mal-nutrition and degeneration of the vitreous, than that they act in a manner peculiar to themselves, namely, by pushing the retina forward from without.

Leber's theory of a primary rupture of the retina is, the author urges, quite inadmissible in the case of intra-ocular tumour, for the process of detachment is gradual and progressive, and the rupture, if it occurs at all, certainly occurs only as a secondary and late result of the displacement; Galezowski has never seen it in cases of sarcomatous tumour. He says that, from the time when von Graefe first treated retinal detachment by tearing the detached membrane with needles, he has been accustomed to recognise the ophthalmoscopic appearances of such a tear or rupture. He states that, among a total of 649 cases of detachment, he has observed a rupture 131 times; among these latter cases there were many in which it was evident that the rupture took place a considerable time after the commencement of the malady, and that it was immediately followed by an effusion into the vitreous body resulting in permanent floating opacities. One such case is related in detail. He lays it down as a general principle that vitreous opacities accompanying detachment of the retina are due to the sub-retinal fluid perforating the membrane and entering the vitreous body. Such opacities were noted in 120 of his cases,

and nearly always in those in which a rupture was present. He urges that the fluid which lies beneath the detached area represents, not a migration from within outwards, as Leber has suggested, but an exudation from the choroid which is apt, in a certain number of cases, to pass from without inwards through an aperture in the floating membrane. As a further refutation of Leber's theory, he points out that it occasionally happens that rupture of the choroid in the posterior segment is associated with a corresponding rupture in the retina, and that in such cases infiltration of vitreous fluid beneath the retina with detachment of the latter very rarely occurs.

After cataract operations, in which vitreous has been lost, it commonly happens, if the eye is hypermetropic or emmetropic, that the loss is made good, and that, although the consistency remains somewhat below the normal, the accident does not lead to detachment of the retina. If the eye be myopic, on the other hand, a detachment is apt to follow very shortly. In these latter cases, again, the theory of Leber seems inadmissible, for there is nothing to produce traction upon, or rupture of the retina, and the vitreous fluid, being already reduced in bulk, would seem little likely to effect an outward passage through it. For these cases, as for all others, the likely causes seem to be, firstly, a liquefaction of the vitreous, secondly, an exudation from the choroid.

*(To be continued.)*

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R. ULRICH (Strasburg). Investigations on the Interchange of Liquids in the Eye by means of Subcutaneous Injections of Fluorescin. *Arch. of Ophth.*, XII., p. 422, Sept.—Dec., 1883.

Ulrich has endeavoured by a fresh series of experiments to discover the causes of the discrepancy between his own results already published (von Graefe's *Archiv.*, xxvi., iii.) and those obtained and published by Ehrlich (*Deutsche. med. Wochenschr.* ii., etc., 1882). His later experiments were made with fluorescin; the results tallied completely with those of the earlier series in which ferrocyanide of potassium was used.

By the record of a simple physical experiment he shows that the colour presented by a fluorescein solution varies greatly according to the background against which it is seen, and hence that the aqueous humour tinged with fluorescein presents a much more distinct coloration in the area of the pupil than in front of the iris. This, he urges, shows it to be an error to suppose that a coloration chiefly apparent in the pupillary area necessarily indicates a stream coming forward *through* the pupil.

In dark rabbits the iris itself, even when impregnated, does not fluoresce, and in white rabbits it does so but little; but in these latter it appears distinctly yellow, as do the edges of the lids, the conjunctiva and the skin, and this yellow coloration is as characteristic of the presence of fluorescein as an actual fluorescence. Hence experiments on white rabbits yield the best indications.

If the anterior chamber be evacuated, after subcutaneous injection of fluorescein, the pupillary and peripheral borders of the iris present, soon and almost simultaneously, a yellow coloration, which rapidly extends over the entire surface of the iris; after this a green fluorescence is seen, first at the upper margin of the pupil, and then descending across the pupil and disappearing at its lower edge. In a short time the green coloration extends from the whole edge of the pupil towards its centre, and a so-called lenticular green pupillary exudation forms, which either stays *in loco* or descends like a hypopyon to the bottom of the chamber, and at last fills it entirely. Under these conditions the pupil sometimes appears of the most beautiful green, while the iris is light yellow. Like other observers (Ehrlich, Pflüger, Schöler, Uthoff), Ulrich derived, on the whole, the impression that the new aqueous fluid appeared at the edge of the pupil. There was no positive evidence either for or against the supposition that it passed from the posterior chamber into the anterior around the edge of the pupil. In his former paper he expressed the opinion that the regeneration of the aqueous after puncture of the anterior chamber proceeded in general from the dilated vessels of the edge of the pupil, and not from the periphery of the anterior chamber as under normal conditions; now, like Ehrlich, he considers it probable that it proceeds from the posterior chamber.

In eyes under the influence of eserine the action of fluorescin was more rapid and more intense, and extended more quickly over the whole iris; it also seemed to disappear more quickly. Ulrich explains the formation of Ehrlich's line as follows:—The ring-shaped, peripheral coloration of the iris is produced by the secretion of a coloured aqueous fluid from the surface of the iris at its periphery. As it is near to the outlet, Fontana's spaces, its greater part at once escapes at the periphery of the chamber; at the top only the escape is retarded by gravity. A drop collects there in the narrow sinus of the chamber, adhering in front to the cornea, and behind to the iris, until gravity overcomes the adherence, then the drop detaches itself, and slowly sinks down—the line of Ehrlich. This explains why, as Ehrlich first noticed, the line forms a triangle at the top. The line of Ehrlich is, therefore, nothing but a descending drop, the direction of which in the quiet eye is exclusively determined by gravity. The line is always vertical, in whatever position the orbit and the eyeball of the animal may be placed.

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**SCHOELER (Berlin). Platinum-coated Glass Mirrors.**

*Klin. Monatsbl. f. prakt. Augenheilk.*, December, 1883, p. 522.

A civil engineer named Lohmann has, it appears, discovered a solution of platinum which, when coated upon glass, gives to the surface of the latter a high reflecting power, without rendering it opaque. Schoeler has found that such a glass can be used as an ophthalmoscopic mirror without a perforation for the passage of the rays of light to the observer's eye. He prophesies that when, as appears quite possible, the reflecting power of the coating shall have been somewhat further increased, this new form of mirror may revolutionise our ophthalmoscopes, and prove of high value, also, in other physiological and optical instruments in which a simultaneous reflection and transmission of light is desired. The colour of the glass thus coated resembles the smoke tint used for spectacles, but is somewhat browner. Another point of interest is that the platinum coating appears to be almost indestructible.



E. NETTLESHIP (London). *The Student's Guide to Diseases of the Eye*. Third Edition. *London : Churchill*, 1884.

This excellent handbook is known to all our readers, and needs, at present, no other description than a statement of the additions which have been made to it in the present edition. The whole book has been revised and new matter added to the amount of sixteen pages. The new features of most importance are a fuller account of Retinoscopy, a separate chapter on Diseases of the Orbit, and the introduction of woodcuts illustrating retinoscopy, alterations in the visual field in various diseases, and the changes in the permanent incisor teeth characteristic of hereditary syphilis. We know of no book which, within a compass relatively so small, deals with its subject so comprehensively.

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G. HARTRIDGE (London). *The Refraction of the Eye. A Manual for Students*. *London : Churchill*, 1884.

The author's aim has been to set forth briefly and clearly the main facts with which practitioners and students should be acquainted in order to diagnose errors of refraction accurately, and to prescribe glasses for their correction. He wisely prefaces his work with the warning that neither book nor observation of others' practice can give the necessary facility apart from the practical working out of a large number of cases. The first two chapters deal with elementary optics, and with the physiology of refraction, accommodation, and convergence ; the next two with modes of estimating errors of refraction ; six more are devoted to the several abnormal conditions of refraction and accommodation, to strabismus, and to asthenopia ; the final chapter includes some information as to various kinds of spectacles, and a series of illustrative cases. Test types are appended.

The author explains his subject, always a difficult one to teach, simply and at the same time scientifically. We are bound to say, however, that there is here and there a want of precision of language which is particularly unfortunate in a work of this kind. For example : (p. 30) "the amplitude of accommodation is the distance between the punctum proximum

and the punctum remotum ;" (p. 40) "a head elongated in its antero-posterior diameter, with a long face and prominent nose, indicates myopia ;" (p. 41) "the proper adjustment of the refraction of the eye is probably the most common cause of a diminution in the acuteness of vision ;" (p. 28) "when the ciliary muscle is relaxed, the elasticity of the capsule comes into play, and compresses the lens so as to make it flatter." Though advising some future revision in the direction indicated, we think the book likely to be a very useful one. It is well printed, tastefully bound, and freely illustrated.

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L. H. TOSSWILL (Exeter). *The General Practitioner's Guide to Diseases and Injuries of the Eye and Eyelids.* London: Churchill, 1884.

This small handbook of 140 pages professes to deal only with the commoner diseases and injuries of the eye, and is intended to help those who have no time to refer to more comprehensive works. The information given is of a useful kind. The scope is narrow. Errors of refraction, strabismus, operations on the eye, and the ophthalmoscope are purposely excluded.

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SPECTRUM COLOURS AND COLOUR  
SENSATIONS :  
EXTENSION OF THE DYNAMICAL THEORY.

BY GEORGE ST. CLAIR, F.G.S.

*An Abstract of a Paper read before the Birmingham Philosophical  
Society, March 13th, 1884.*

The existence of three primary colours and of three colour sensations may be doubted. It is difficult to conceive that a repetition of equal impulses of the luminiferous ether should affect the rods and cones of the retina in different ways; and equally difficult to believe that the spectrum colours, whose vibration rapidities are a continuous series, can be fairly represented by the triangular diagrams given by Maxwell and Helmholtz. Light being substantially the same as radiant heat, it may be permitted to seek a clue in the phenomena of heat, even though it be the heat of conduction in liquids. The temperature of water depends on the agitation of its particles, and there can be no doubt that the vibrations are quicker for the higher temperatures. When we mix two pints of water of different temperatures the result is a quart of water at the mean temperature. Analogically, when we mix different rays of the spectrum we may expect double illumination but medium wave-length; for instance, taking the wave-length of red to be 0.0000256\* and that of yellow 0.0000227, the mean is 0.0000241, which is very close to the wave-length of the orange colour which is produced. White light is the mean of the whole gamut, and the wave-length is about 0.0000213, which places white between green and yellow, where the eye would expect to find it. The explanation of all complementary pairs is to be sought in the same way; although the sum of the wave-lengths

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\* These decimals are fractions of an English inch.



of red and green is nowhere near the sum of the full scale of colours, yet the mean is very nearly the same, and again falls between green and yellow. Other 'means' come a little out of the expected place, but the white produced by combining purple with green is accounted for exactly when purple itself is regarded as having a wave-length midway between red and violet. In confirmation of the place assigned to white, reference is made to Newton's rings, some of which show white supplanting green in the series of colours.

The theory of three primary colours is disputed. It is easy to see why red and violet, at the extremities of the scale, cannot be compounded by mixing other colours. Neither of them is a mean between two others, and no two wave-lengths in the scale will yield the requisite decimal. But it may be anticipated theoretically that if orange rays were blended with the heat rays a little below the red, we should have red rays start into visibility. The argument applies to violet also, *mutatis mutandis*. Green is more puzzling; but although the mixture of yellow rays with blue produces white and not green, yet the wave-length of white is so very near to that of green that the experiments directed to the one end may conceivably have the other result, without at all proving green to be a simple colour.

We may look for a simplicity within the eye corresponding to that which prevails outside, disbelieving in several sorts of rods and cones. The rods and cones, it is suggested, are an apparatus whose function it is to receive the various coloured rays which fall upon them, and blend them into waves of uniform length, so as to produce the one sensation proper to the union. What a ray gives up in rapidity of vibration it absorbs in larger wave-length, the total quantity of motion remaining the same, as the law of the conservation of energy requires. It is true that when different coloured rays of the spectrum are blended, so as to look chromatically one, they may still be resolved again into their constituents

by passing them through a prism ; but this does not show that the rays may not coalesce and merge their wave-lengths in the rods or cones of the retina ; it only shows that the screen upon which the spectrum is received is not a retina with rods and cones.

The theory is tested by applying it to the explanation of complementary colours and after-images. The "fatigue theory" is set aside. Mr. Sydney Hodges, in a paper in the "Nineteenth Century," October, 1883, suggests "some law of compensation" like "the springing back of the branch which has been forced down by an unusual strain;" but this is too indefinite. Mr. W. Cave Thomas\* asserts a principle which he terms the libration of compensation. He gives a table in the following form—

Defect.	Mean.	Excess.
5 - - - - -	6 - - - - -	7
4 - - - - -	6 - - - - -	8
3 - - - - -	6 - - - - -	9
2 - - - - -	6 - - - - -	10
1 - - - - -	6 - - - - -	11
0 - - - - -	6 - - - - -	12

and argues that if there be a demonstration of force in excess of a mean state, 6, which may be represented, say, by the figure 9, it will be followed and compensated by an opposite state in defect which may be represented by 3, and *vice versâ*. As an explanation of after-images this hypothesis is shown to be insufficient. The dynamical theory affords a solution. In descending the shaft of a coal mine, as you get near the bottom the steam is shut off and the speed slackens, but you experience a sensation of being drawn up. Suppose the initial speed to be as 100, and that it is slackened to 40 ; the body, by inertia, continues to expect 100 ; the difference is 60, and this difference is felt by contrast as reverse motion. Moving railway trains affect the eye in a similar way, and show that the retina is subject to the same law. Again, when the two hands, after

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\* The Revised Theory of Light: by W. Cave Thomas. Smith, Elder and Co., 1875.

being immersed in basins of water at different temperatures, are brought into water of medium temperature, the liquid feels cold to one hand and warm to the other. The sensations are relative, and measured by contrast with the preceding condition of the nerves. These facts suggest an explanation of complementary or negative images. Take, as the simplest case, a black spot on a white ground ; having gazed and then covered the eyes, we perceive a white spot on a black ground. All that area of the retina which has been impressed with white light, whose vibration rapidity may be taken as 554 billions, now experiences darkness, which is a cessation of all stimulus, and therefore suffers a decline of motion represented by those figures. But the parts which were impressed with the black spot were not stimulated before, any more than they are now, and they experience no decline by covering the eyes. They being at rest while the remainder of the retina is sinking to a degree represented by 554 billions, are relatively rising by that amount, and a sensation which is positive by 554 billions over darkness is equivalent to a sensation of white light. Similar explanations are given of coloured negatives.

With respect to colour blindness, the author would have anticipated theoretically that the deficiency would relate to one or other end of the spectrum, but would expect that such colours as are visible to the colour blind should produce sensations like those produced in normal eyes. But mixed colours which contain red (or violet) should appear as they would to normal eyes if black were substituted for red (or violet). The colour-blind should be impressionable to white light because its wave-length is the mean of all, whereas colour blindness relates to the extremes of large and small ; yet perhaps the white would have a tinge of blue to red-blind eyes, as the mean of all colours, after red is abstracted, is thrown between green and blue. And correspondingly, white objects might appear yellowish

to the violet blind. Certain recorded facts are favourable to these calculations, and others not; but more facts of a reliable sort are wanted. There has been a difficulty in ascertaining what the perceptions of the colour blind really are, through the want of a reliable common language between the patient and the investigator. But recently two persons have been discovered who are colour blind of only one eye, the other being normal, and who are able to explain their different perceptions. These facts are quoted from Continental authorities by Mr. Droop, and discussed by him, with the theories founded on them.\* But Mr. Droop gives other facts which seem favourable to the author's theory.

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## NOTE ON TOBACCO AMBLYOPIA IN WOMEN, WITH REMARKS.

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Cases of tobacco amblyopia are of such frequent occurrence, and so much has been written of late years on the subject, that few, if any, of those who are interested in the diseases of the eye can be ignorant of the symptoms accompanying that interesting form of poisoning. To judge from the literature of toxic amblyopia, as well as from the fact that, although I have carefully looked out for the symptoms in women for the last five or six years, I have only met with them in three cases, I conclude that the affection is very rare indeed in women. That this should be so is very strong evidence that tobacco is the primary element in the causation of the amblyopia. While few women smoke to any great extent, they cannot be said

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\* Colour Sensation. By H. R. Droop, M.A. Read before the Physical Society, April 28, 1883, and printed in the "Philosophical Magazine" for June, 1883.

to be so abstemious with respect to alcohol. This argument I have elsewhere had occasion to refer to and it has been urged by others who have written on the subject.

In two of the cases occurring in women in which there were the ordinary symptoms of the affection (central colour scotoma, good peripheral vision, and diminution of the central visual acuity, in the one case to  $\frac{20}{200}$  in the other to  $\frac{20}{100}$  in both eyes), I took some trouble to convince myself that there was no abuse of alcohol. The one certainly never touched any kind of spirit, and the other rarely, and never to excess. In the third case it was denied, and although I was not able to test the veracity of the patient's statements I had no particular reason to doubt them. Here then were three cases, in two of which certainly, and in the remaining very probably, alcohol could have nothing to do with the production of the amblyopia.

In the class of men most commonly affected with this form of amblyopia, it is not often that we are able to exclude the possible influence of alcohol, but I have met with a few cases in teetotallers and a very considerable number amongst men who were certainly not addicted to excess; indeed, I have no reason to modify my previously expressed view\* that except where the free indulgence in alcohol has led to the undermining of the constitution, thereby allowing the toxic effect of the tobacco to get the upper hand, it more probably counteracts than abets the poisoning which gives rise to the amblyopia. All three were in the habit of smoking on an empty stomach, and this I have all but invariably found to be the case amongst men with this form of blindness. They have to work an hour or two before breakfast, and many smoke during the most or the whole of that time; not a few wake up in the middle of the night and light their pipes. So universal is the habit of smoking after a prolonged

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\* Ophth. Hosp. Rep., Vol. X.

fast in these cases that I am disposed to think that the blindness very rarely occurs if smoking be only indulged in after a meal, even though the amount consumed be not inconsiderable. Thus smoking at night, which is a very common habit, is not so dangerous in this respect as smoking in the morning before the fast has been broken. Generally, besides this habit of smoking on an empty stomach, there has been some more recent change in the habits or state of health of the patient which has allowed the scales to turn in favour of the cumulative toxic effect of the tobacco. The most common are probably grief, sleeplessness, and dyspepsia. The two last may indeed be set up by the tobacco itself, and in this way a *circulus viciosus* be established ; but with regard to sleeplessness, at any rate, this is, I think, more often not the case.

To return to the cases under consideration. The first was a tramp, who had no regular meals, but made enough by her profession to keep her pipe going. In her case I could find no other clue to the immediate cause of the poisoning than that she had been worse fed of late and consequently more in the habit of smoking during a period of fasting.

The second was a woman of 63, who had smoked half an ounce per week of "twist" for forty years. Nine months before she first presented herself she had lost her husband. This had caused her so much distress that she had suffered from sleeplessness ever since, and although she had not increased the amount of tobacco she had been unable to obtain as nourishing food as before, and frequently smoked on an empty stomach. At the time of her husband's death she could read newspaper type, but her vision when tested had diminished to  $\frac{20}{200}$ .

The third case was one of an old servant, aged 57, who was known to have smoked for many years, getting up early in the morning to enjoy her pipe undisturbed in the scullery. Her blindness had come on from two



to three months previous to the time she was first examined, when the vision (with + 1, 50) was  $\frac{20}{100}$ . Latterly she had suffered from sick headaches and an irritable condition of the stomach, and frequently took no solid food for days, smoking while the other servants were at their meals. She consumed at the same time a large quantity of tea. The ophthalmoscopic appearances in all three cases were confined to slight palor of the temporal sides of the discs, which since the publication of the result of post-mortem examinations in two cases of central scotoma by Samelsohn\* and Nettleship† must presumably be ascribed to some actual neuritic change. But that this interstitial change is not the *direct* cause of the symptoms appears evident from the fact that the cases get well when the tobacco is withheld, whereas the palor very often, if not always, remains. It would seem more probable that some vasomotor disturbance or other "functional" disorder was the cause at once of the amblyopia and the interstitial changes in the nerve.

In putting on record these three cases of tobacco amblyopia in women I have taken occasion to refer shortly to what I consider to be the cause and nature of the affection in general. The views expressed are, I believe, supported both by the rarity of its occurrence in women and by the symptoms and histories of the three cases themselves. They are, to recapitulate:—  
 1st—That alcohol has no *direct* influence in the causation of the amblyopia. 2nd—That smoking at a time when the counter-stimulus of food is absent more commonly tends to produce it than smoking at other times. 3rd—That the outbreak is *most* likely to occur if, along with the want of food, the system be, for the time being lowered by nervous exhaustion or imperfect nutrition. 4th—That the disease is *essentially* functional.

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\* Graefe's Archiv., 1882, Pt. I., pp. 1—110. (A most valuable paper in other respects as well.—O.R., Vol. I., p. 310)

† Trans. Ophth. Soc., Vol. I.

## NOTE ON THE EMPLOYMENT OF THERMOMETRY IN CATARACT EXTRACTIONS AND OTHER OPHTHALMIC CASES.

BY SIMEON SNELL,

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AND TO THE SCHOOL FOR THE BLIND.

The Thermometer is in just as regular use in surgical as in medical cases, and the indications it affords are no less valued. This short note is intended to direct attention to its employment in ocular surgery. Perhaps I may be in error in supposing that the ophthalmic surgeon, generally speaking, makes but little use of Thermometry. At all events he will, I believe, often derive distinct aid from its employment. In many cases the indications afforded will be similar to that in corresponding conditions in other parts. The formation of pus, whether in the orbit or elsewhere, exhibits a more or less characteristic temperature chart. My object now, however, is chiefly to indicate that in cataract cases we may learn something from its regular and systematic use. For about the last two years, in all my hospital cataract extractions, the temperature has been recorded. It has generally been commenced a day or two previous to the operation, and discontinued a week or so after if progress has been satisfactory. It is in the earlier days, whilst the eye is still covered, and when we have to glean our information as to how the case is going on from the feelings of the patient, or it may be from evidence afforded by the pulse and tongue, that I believe the Thermometer affords another means of knowledge and is of value. If the case is progressing well there is no elevation of temperature, and the record will run a normal line. Should, however, on the other hand, suppuration or severe iritis set in, the fact of something being not right is clearly indicated by the tracings on the temperature chart. Such an example recently occurred. The patient was a most unfavourable subject,

and this in spite of preliminary preparation. She was blind with double cataract ; had trichiasis, old granular lids, and a narrowed palpebral aperture. Extraction by means of a modified Graefe's operation, on account of this latter condition, was performed with difficulty ; vitreous escaped. The next day the Thermometer indicated  $101^{\circ}$ , and kept at about that point for the next few days. On the eye being opened the wound was found dusky, with a tendency to necrosis.

In slight iritis I believe there is but little tendency to rise of temperature, but my experience is that the Thermometer generally may be held to show when any serious condition is progressing in the eye.

A. NEISSER (Breslau). The Nature of Jequirity Ophthalmia. *Centralbl. f. prakt. Augenheilk*, Feb., 1884, p. 51.

E. Klein (London). The Etiology of Jequirity Ophthalmia. *Centralblatt f. d. Medicinischen Wissenschaften*, Feb. 23rd, 1884, and *Centralbl. f. prakt. Augenheilk*, Feb., 1884, p. 55.

SALOMONSEN and HOLMFELD (Copenhagen). The Etiology of Jequirity Ophthalmia. *Centralbl. f. prakt. Augenheilk*, March, 1884, p. 91.

Sattler's conclusions on this subject (*vide* O. R., vol. II., p. 274) have been carefully tested by several experimenters. The results show that his theory, satisfactory as it seemed at first, must be abandoned. Sattler believes that jequirity ophthalmia is due to the presence of a bacillus, but since it occurs even when the infusions employed are free from bacilli, he assumes that the spores are derived from the air, in which they exist in a harmless form, and that they acquire their specific property in some way from the jequirity infusion. The later investigations show that the bacilli which usually form in these infusions, so far from being the active cause of the inflammation, tend, as they multiply, to diminish the activity of the infusion, and that the active principle is probably a vegetable substance soluble in water and destructible by boiling.

Neisser's results may be briefly stated as follows :—

1. Infusions which are kept free from bacilli remain for long periods as active as fresh infusions containing bacilli. With the formation of bacilli their activity decreases. Warm temperatures (38—39° C) appear gradually to destroy their activity, even in the absence of bacilli.

2.—Inoculations with jequirity-bacilli cultivated in other fluids are without effect.

3.—No bacilli are to be found either in the secretions from the inflamed conjunctiva nor in the tissues themselves in jequirity-ophthalmia, and no results follow an inoculation with such secretions or tissues.

Klein's experiments were of the following kind :—

Freshly prepared jequirity infusion was carefully filtered, contact with air being avoided as far as possible in the process of filtration. Small quantities of the filtrate were introduced by means of a capillary pipette into the conjunctiva bulbi of rabbits, and by means of the same pipette into test tubes containing sterilised nutritive fluids (steriles Nährmaterial). This latter operation was done without permitting atmospheric germs to effect an entrance at the same time. The results in every case were violent jequirity ophthalmia in the rabbits, and absolute freedom from bacilli in the test tubes, although the latter were kept at a suitable temperature for the growth of the micro-organisms if they had been present. A second series of similar experiments produced the same results.

When a filtered infusion was boiled it lost its property of exciting ophthalmia. Klein does not consider this a proof that the loss is due to the death of the bacilli, but rather an indication that some sort of ferment has been destroyed. His crucial experiment, however, consisted in the application of the bacilli to the conjunctiva without the subsequent appearance of ophthalmia. He found in every single case that no ophthalmia resulted from the inoculation of bacilli developed in sterilised soils, or even in sterilised jequirity infusion itself, which had been submitted to a few seconds' boiling. The boiling took place immediately after the bacilli were introduced into the test tubes, and the inoculation was made with the bacilli which appeared in the test tube next day.

He concludes from these experiments that the active principle in jequirity infusions which produces the ophthalmia can have nothing to do with the bacilli, his conclusion being strengthened by the observation that the conjunctival discharge in jequirity ophthalmia does not contain bacilli or spores, and does not possess the property of contagion in the least degree.

Salomonsen and Holmfeld found as other observers, including Sattler, have done, that infusions which are completely free from bacilli are active in producing ophthalmia. Also that the secretions and tissues of the inflamed eye show no bacilli under the microscope, and yield none when cultivation is attempted by the inoculation of nutrient fluids; or at least, that when bacilli do make their appearance under such cultivation they are not of that kind which flourishes in jequirity infusions and which is supposed by Sattler to be the specific agent in the production of the ophthalmia. And again, that inoculation with cultivated jequirity-bacilli is without effect. The latter point they further investigated in a peculiar way. Cornil and Berlioz have lately observed that frogs are killed in a day or two by the subcutaneous injection of a few drops of jequirity-infusion and that the blood of a frog so killed is loaded with jequirity-bacilli. In the experiments under notice, the authors found that conjunctival inoculations with such blood were entirely without effect. They conclude that the agent which gives rise to the ophthalmia is entirely distinct from the bacilli and is probably a chemically poisonous substance. Experimenting further on the nature of this substance they discovered that it is insoluble in alcohol, ether, benzoline, and chloroform, but soluble in glycerine as well as in water. Using 25 parts of pure glycerine to 1 part of powdered seeds they obtained a solution of great activity, and one which retained its activity unimpaired for a month. They believe that a glycerine preparation will be found to be permanently active and will advantageously replace watery solutions which are unstable and liable to decomposition.

Further evidence on the same subject showing, like the foregoing, that the bacilli of jequirity infusions must be acquitted of any essential participation in the production of jequirity-ophthalmia, will be found in the paper by A. H. Benson, read at the last meeting of the Ophthalmological Society. (*Vide p. 122.*)

1. WARLOMONT and LOISEAU. Ophthalmoscoptometer. *Annales d'Oculist.*, Sept., 1879, p. 129.
2. LOISEAU. Optometry. *Annales d'Oculist.*, Jan., 1881, p. 5.
3. JAVAL. Optometry, third contribution. *Annales d'Oculist.*, Jan., 1883, p. 5.
4. JAVAL. Optometry, fourth contribution. *Annales d'Oculist.*, Sept., 1883, p. 105.

1. The Ophthalmoscoptometer of Loiseau and Warlomont is an instrument for measuring the refraction of the eye by means of the inverted ophthalmoscopic image in a manner somewhat like that of Schmidt Rimpler (*vide* p. 112). Indeed, the instrument may be regarded as in some sort a modification of that of the latter author. It consists of two brass cylinders, one gliding within the other. At the anterior extremity of the external tube there projects an arm to keep the instrument at a fixed distance from the patient's eye, and a concave glass reflector to throw light into the eye. The reflector resembles a meniscus, except that the curvatures of its two surfaces are equal, so that it exerts no appreciable influence upon the rays of light, which, coming from the retina of the observed eye, have to traverse it on their path into the interior of the instrument. A convex lens of 14 D strength is fixed behind the reflector at the anterior extremity of the outer tube. This tube, and also the internal one, are open at their posterior ends. The anterior end of the internal tube is partly closed by a muffed glass, which can be moved by the gliding of the tubes either towards or away from the convex lens. These movements are read off upon a scale, each centimeter of which in practice corresponds to a difference of refraction of 2 D. In using the instrument the observer determines the point at which the sharpest image of some portion of the fundus, for instance the optic disc, is thrown upon the muffed glass, and the distance of this point, measured from the zero of the scale, gives the refraction, hypermetropia being to one side and myopia to the other side of the zero. The small arm which projects from the anterior extremity of the instrument keeps it at a fixed distance from the observed eye, so that the surface of the cornea coincides with the focus of the convex lens. This necessitates an addition



of 13 mm. to the punctum remotum obtained in hypermetropia, and a subtraction of the same amount in myopia.

2. Loiseau passes in review the principal optometers which have been invented for measuring the refraction of the eye, and classifies the methods of optometry employed into subjective, mixed, and objective.

First on the list of the *subjective* methods he places the optometer of Javal, which, in spite of its expense (£20), has been extensively used by Continental oculists, and is considered by Loiseau to be as nearly perfect as an instrument of the kind can be. Nearly all the other optometers of this class possess defects, the commonest being the variable size of the retinal images which they form. This defect occurs in Burow's and Graefe's optometers, rendering the amount of myopia estimated by these instruments too high and the amount of hypermetropia too low. Badal's improved binocular optometer, however, is held by Loiseau to be an excellent instrument, being only inferior to that invented by himself from its greater size and price, and from not having quite so simple a theoretical basis. The essential difference between Loiseau's optometer and Badal's is that in the former the distance between the test type and the convex lens remains invariable, the refraction being determined by altering the power of the lens employed by means of convex or concave glasses, while in the latter the same object is attained by movements of the test type. Badal avoids the changes in the size of the retinal images by placing the convex lens not at the anterior focal point of the eye under examination, but so far off that the focus of the lens coincides with this point. In Loiseau's optometer, as the distance of the test types from the lens does not alter, the lens is placed at the anterior focal point.

*The Mixed Method.*—By this Loiseau means the determination of refraction by the erect ophthalmoscopic image, for which purpose so many refraction ophthalmoscopes have been invented. He uses the term mixed because though for the patient the method is objective it is for the observer essentially subjective. He also includes in this class the extremely ingenious method used by Schmidt Rimpler for determining the refraction by the inverted ophthalmoscopic image, although, as this method does not in any way depend upon the accommoda-

tion of the observer's eye, there is no possibility of subjective errors in the measurement, and it seems more logical to include it with Loiseau's ophthalmoscoptometer, in the third class of purely *objective* methods.

3. Javal describes and figures in this article various images which he has obtained from different regions of the cornea by means of his keratoscopic disc—a disc of concentric black and white circles similar to that known as Placido's disc. The principal conclusion to be drawn from his observations is that there are frequent alterations in the curvature of different regions of the cornea, which, but for some such means of investigation as this disc presents, would pass unobserved, and which in many cases are to be attributed to antecedent inflammation.

4. Javal concludes in this article his valuable series of contributions to ophthalmometry. He describes the method of using his ophthalmometer and warns against possible errors from want of attention to details. With proper care the limits of error in ophthalmometrical observations do not amount to more than 0.25 D. He finds that the ophthalmometer alone enables him to prescribe glasses for (1.) old people who have no accommodation, (2.) myopes who habitually do not accommodate in reading, and (3.) eyes affected with strabismus either convergent or divergent. The only exceptions are in certain cases of high astigmatism where Javal has found a static astigmatism of the lens in the same meridian as that of the cornea. In one case this amounted to as much as 2 D.

In adults, and above all in young people, he finds that the manifest astigmatism (not the total, which is ascertained by atropine paralysis) is inferior to the corneal astigmatism. In prescribing glasses for young people he thinks it wrong to correct the total astigmatism except in cases of myopia, and in ordering convex cylinders for such individuals contents himself with glasses the strength of which slightly exceeds the amount of manifest astigmatism. In simple presbyopia and hypermetropia his principles are similar, allowing the patients to provide themselves with the weakest glasses which correct their asthenopia, and not binding himself by any fixed rules as to the distance at which the near point or the far point should be situated at a given age.

In prescribing glasses for myopia he takes into consideration the state of the retina, the age, sex, profession, and habits of

the patient. In weak myopia he allows a *face à main* for distant vision, and for near vision, if the M. is less than 4 D and the patient is a child, convex glasses sufficiently strong to place the far point at 25 cm. distance. After a year or two of these glasses he prescribes weaker ones to place the far point at 33 cm.

Javal holds that the middle degrees of myopia (from 4 D to 9 D) are generally produced by allowing children with weak myopia to use concave glasses. In these cases he under-corrects the ametropia so as to leave always 3 D or 4 D of M uncorrected, and prescribes a *face à main* to be used in addition for distant vision. By this device he insures that the children will not use, for reading or near vision, glasses that completely correct their myopia.

The higher degrees of myopia are not in his opinion the results of progressive myopia in school life, but are due to a malformation which would have equally been present if the individuals had never used their eyes at all. For such cases the weakest glasses which enable them to read at 25 cm. distance, or in some cases necessarily at even a shorter distance, are prescribed for permanent use, and a *face à main*, or *pince-nez*, is added for special purposes, such as music, etc.

Javal concludes with the observation that in cases of anisometropia with astigmatism the following rule is generally applicable. When the corneal astigmatism of the left eye is greater than that of the right eye the meridian of least refraction of the left eye has a lower refraction than the corresponding meridian in the right eye, and the meridian of highest refraction of the right eye has a lower refraction than the corresponding meridian in the left eye; and the converse of this holds when the corneal astigmatism of the right eye exceeds that of the left eye.

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M. BURCHARDT. A New Method of Estimating Refraction from the Erect Image. *Centralbl. f. prakt. Augenheilk*, Dec., 1883, p. 353.

NAGEL. Objective Estimation of Refraction by the inverted Ophthalmoscopic Image. *Graefe Sämisch Handbuch*, Vol. VI., p. 429.

When, during direct examination of the fundus oculi with a plane mirror, we see a clearly defined picture of the

lamp-flame upon the retina, we know that the eye is exactly focussed for the rays emanating from the lamp, or in other words that it has a myopia corresponding to the distance of the lamp. Burchardt proposes to estimate refraction by ascertaining what amount of divergence or convergence the illuminating rays must assume in a given case in order to give such a clearly defined retinal image. A semi-transparent screen, on which letters are painted, is illuminated from behind by means of a parallel beam of light, and becomes the source of light. The light from this screen is received by a plane ophthalmoscopic mirror close to the observed eye, and the observer looks at the picture of the screen upon the retina. Between screen and mirror, and at a fixed distance from the latter, a convex lens is placed. The degree of convergence or divergence of the rays received by the ophthalmoscope is thus variable at pleasure by placing the screen nearer to or further from the lens. The screen slides upon a graduated bar, the divisions of which indicate degrees of ametropia. The author does not claim that the method is practically superior to others commonly in use.

The methods of determining refraction by means of the inverted ophthalmoscopic image have been so much overlooked in English ophthalmic literature that it will not be out of place here to notice the simple arrangement which Schmidt Rimpler has adopted for this purpose. He does not make use of the image of the retina itself, as is done in Loiseau's ophthalmoscoptometer, but observes the image of the source of light thrown upon the fundus, the same image that forms the object of investigation in so-called Retinoscopy, except that in the latter no convex lens intervenes. The apparatus consists of a convex lens, from which an arm projects to keep it at such a distance from the observed eye that its focus and the first principal point of the eye coincide. A tape measure on the opposite side of the lens determines the distance of this lens from the concave ophthalmoscopic mirror, from which data the distance between the principal focus of the lens and the inverted image of the source of light reflected from the concave mirror is known. This distance expressed in centimetres gives the amount of ametropia in terms of a dioptric, myopia to the one side of the focus of the lens, and hypermetropia to the

other. It is plain that if the eye examined be emmetropic, and its accommodation be at rest, the best defined image of the source of light will be obtained when the focus of the concave mirror coincides with that of the convex lens, as it is at that point that the inverted aerial image of the fundus is situated. In myopia the focus of the concave mirror must lie nearer to the lens than the focal length of the lens, in order to obtain the best definition, and in hypermetropia it must lie further from the lens than the focus of the latter. When the lens is so placed that its focus coincides with the first principal point of the eye, equal movements of the external source of light (*i.e.*, the inverted image formed by the concave mirror) along the optic axis correspond to equal differences in the refraction of the observed eye. The glass used is  $+ 10$  D, and in this case every alteration in the refraction amounting to 1 D alters the position of the aerial image of the fundus 1 cm. According to Schmidt Rimpler's experience, skilled observers can measure the position of the best defined image accurately up to 0.75 D.

Among the many methods which have been proposed for the objective estimation of refraction there is not one, we think, test which is likely to hold its ground against *retinoscopy*. With types, test lenses, and an ophthalmoscopic mirror, refraction cases are dealt with in our experience with more certainty and with greater ease than by the help of any other apparatus, including even the refraction ophthalmoscope. We venture to predict that the simplest and least expensive instrument of all, the *plane* mirror (*vide* O. R. Vol. II. p. 228), though not at present used by many, will in time be universally adopted for the objective determination of refraction.

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W. STOOD (Cologne). Formation of Colloid or Vitreous Bodies on the Optic Disc. *Klin. Monatsbl. f. Augenheilk.*, Dec., 1884, p. 506.

At the Heidelberg Ophthalmic Congress of 1868 Ivanoff exhibited longitudinal sections of an optic nerve in which he had found, behind the lamina cribrosa and close to the central vessels, a number of small globular bodies resembling the

excrescences which are often found attached to the elastic lamella (*lamina vitrea*) of the choroid in degenerated conditions of the eye. Though resembling amyloid bodies they gave no amyloid reaction, and appeared to have originated like the bodies above mentioned in the elastic lamella of the choroid, and to have found their way thence into the substance of the optic nerve, pushing aside but not materially altering its tissue. He had found similar bodies in the optic nerves in six cases; in one instance the acuity of vision had been normal, in one there was amaurosis from cerebral disease, in the other four the eyes had been lost through severe injuries. His inference was that such formations in the optic nerve could not be very rare in spite of their having almost entirely escaped clinical observation. Liebreich appears to have previously met with ophthalmoscopic changes, the cause of which had remained unknown until Ivanoff's specimens supplied the explanation.

Not until ten years later were any clinical observations bearing on this subject put on record, when Nieden (*Centralbl. f. prakt. Augenheilk*, 1878, p. 6) and Jany (the same, 1879, p. 167) described cases in which these bodies were seen with the ophthalmoscope. To these Stood now adds two more, with drawings of the ophthalmoscopic appearances.

In the first case the patient was a man, aged 31, suffering from "myelo-meningitis with descending optic-neuritis;" examined two years after the onset of spinal symptoms central vision was normal, but the fields were much contracted; the discs pale with ill-defined edges, the arteries small; over the surface of the discs were scattered a number of distinct shining bodies which were diagnosed at the time (1875) by Dr. Samelsohn as vitreous bodies from the elastic lamina of the choroid, the presence of which was independent of the optic neuritis. Eight years later the patient came again under notice, improved as regards spinal symptoms, with normal acuity of central vision but contracted fields just as before, and with the same peculiar appearances in the discs. In the erect image the new formations appeared as brilliant white strongly reflecting bodies of roundish form, most numerous near and at the lower-outer margin of the disc, protruding from the plane of the disc, and at the place mentioned steeply



overhanging its margin; two lay beyond the margin of the disc. The appearances were nearly the same in the two eyes.

In the second case the patient was a girl, aged 17, who came under treatment for convergent strabismus. Here again there were traces of a past neuritis, probably dating from very early life; discs pale and ill-defined at the margin, central acuity somewhat defective, fields contracted. Bodies closely resembling those seen in the former case protruded from both optic discs, and gave them the appearance of being studded with minute glass beads; about 10 such lay along the outer margin, and as many more within the area of each disc.

Reviewing the four cases in which these bodies have been seen, it appears that the ages of the patients varied from 14 to 38; in one case the eye in question appeared otherwise healthy, in one there was retinitis pigmentata, and in the two others there was evidence of past neuritis.

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## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MARCH 13TH, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

*Retinal Glioma*.—Mr. Simeon Snell related two cases of glioma, in one of which shrinking of the eyeball occurred without perforation. (1) A child, aged eighteen months, had, when first seen, at the posterior part of both eyes, a yellowish deposit, most marked in the left. A history of fits was given, and of "congestion of the brain." The deposit was supposed at this time to be strumous deposit. During the next three months the left globe became filled with deposit, the iris infiltrated, and exudation appeared in the anterior chamber. The eye next began to soften and shrink, being ultimately reduced to a small stump. Soon afterwards the right eye underwent similar changes, but did not shrink, and a year after the onset was excised. The growth presented the microscopical characters of glioma. The disease recurred in the orbit, and the child died six months later. Was the disease glioma from the first? The shrinking of the first globe was very unusual,

and against the idea of glioma. Possibly the original diagnosis of struma was correct, and the glioma had been engrafted upon an already damaged eye. (2) An infant, aged eight months, presented when first seen a whitish-looking growth at the posterior part of each eye; this appearance had been noticed since the child was three months old. The right eye was removed: the growth appeared to be composed of caseous material. Three years later the left eye, being quite filled by the growth, was removed. The child died eighteen months after with a tumour on her forehead. The points to which the author called attention were, that the disease was probably congenital in both eyes, that it remained quiescent in the left eye much longer than in the other, that there was no recurrence in either orbit but on the forehead, and this was attributed to a blow.

Dr. W. A. Brailey had seen one case similar to the first of the two described by Mr. Snell. The patient was a young girl. The right eye was the seat of a genuine glioma. At an earlier date the left eye had presented all the appearance of a pseudoglioma, and was excised; microscopical examination afforded no evidence that it was gliomatous, though there was a connective tissue growth in the choroid. The subsequent occurrence of glioma in the other eye, however, led him to doubt the correctness of his first conclusion. He suggested that there was some relation between tuberculous cases, which formed a large proportion of all the cases of pseudoglioma, and cases of true glioma.

*Severe Conjunctivitis from Whisky thrown into the Eyes.*—Mr. G. A. Brown.—The patient was seen the day after a glass of neat whisky had been thrown in his eyes. Both eyes were closed, the lids much swollen, with yellowish, sanious, semi-purulent discharge. The lower half of each cornea was covered by a diphtheritic-like membrane, which peeled off, leaving the cornea clear. The conjunctivæ were deeply injected, and there were slight ecchymoses, but no chemosis. There was much pain and intolerance of light. Under belladonna fomentations, and syringing with a warm weak solution of boracic acid, improvement rapidly took place. In two days the membrane had disappeared, and the conjunctivitis and photophobia soon subsided, so that the man was well in a fortnight.

*Treatment of Malignant Glaucoma.*—Mr. M. McHardy advocated an unusually large primary section in iridectomy for primary chronic glaucoma. For such cases he never made a smaller incision than he would make for the extraction of a full-sized cataract. His ideal incision for primary chronic glaucoma was as nearly as possible the corneal diameter measured in a straight line, from the outside of the puncture to the outside of the counter-puncture. The incision lay parallel with, but one millimetre posterior to, the margin of the cornea. He endeavoured to remove the entire segment of iris corresponding to the section. He had never seen occasion to regret the extent of these sections. Their size did not appear to increase the frequency of malignant glaucoma from an advance of the lens. This catastrophe had happened once in thirty cases, and was then happily relieved by the spontaneous escape of the lens, without any loss of vitreous humour, twenty-two hours after the operation; the eye made a favourable recovery, and subsequently exhibited a far more satisfactory degree of tension than the fellow-eye, which had been since treated by a maximum iridectomy, but from which the lens had not been removed. This patient was exhibited. In the case of a man with recurrent subacute glaucoma, upon the return of glaucomatous symptoms, after a very free upward iridectomy, a similar iridectomy was practised downwards; the lens presenting in the lips of the wound was ejected in its capsule at the time of operating; the eye was then treated as after an extraction, and made an uninterrupted recovery. A man, aged 47, was shown, whose two eyes had been treated for primary chronic glaucoma by iridectomies with large sections such as had been described. His better eye possessed  $V = \frac{6}{1\frac{1}{2}}$ , and showed with how close a union these extensive ocular wounds might heal.

*Hyposcleral Cyclotomy in Acute Glaucoma.*—Mr. G. E. Walker showed a patient who had applied to him with extreme glaucoma. The prognosis formed was extremely unfavourable. He, however, recovered after the operation of hyposcleral cyclotomy. This operation was of the greatest use in acute glaucoma; by relieving the inflammatory tension of the ciliary body, it produced at once great alleviation of all the symptoms; the tension did not fall at once, but gradually sank to the normal. It was performed as follows. The eye was fixed and

kept open by a speculum; a very narrow bladed knife was thrust through the clear corneal tissue, about a line from the sclero-corneal junction; the direction of the knife was then altered, and it was made to cut through the ciliary body up to the sclerotic; the knife was then slowly withdrawn without enlarging the wound, so as to prevent prolapse of iris. His operation was the exact opposite of Mr. McHardy's, for his incision was not more than one-sixteenth of an inch long. In this case keratitis had been set up by it. He had long held that all glaucoma was inflammatory, produced by inflammation of the ciliary body, and the cure must, therefore, be by rest and relief of the ciliary body. The ultimate cause of glaucoma was excessive action of the ciliary body. In chronic glaucoma, he believed that any operation which did good acted by producing a subconjunctival fistula, and not by producing a cystoid cicatrix. Glaucoma, he contended, was produced by overtaxed accommodation, and was to be prevented by proper attention to this point. He thought that iridectomy must tend to close Schlemm's canal, rather than to open it.

Mr. McHardy had examined Mr. Walker's case, and doubted whether it was an example of primary glaucoma at all; there were many synechiæ which could not have resulted from the glaucoma. Further, it was a case of acute, and not of chronic glaucoma, and his own paper had dealt only with the treatment of the chronic form; almost any operation would cure the acute form. If glaucoma was due to overwork of the ciliary muscle, why did it not commonly occur in students? Also, why should atropine aggravate and not relieve glaucoma on this hypothesis?

Mr. Walker, in reply, was satisfied that in his case the iritis was clearly secondary.

*Spasm of the Ocular Muscles.*—Dr. Gowers first pointed out that the ocular muscles may participate in the spasm of chorea, and that transient diplopia from this cause is not uncommon during the course of chorea. He next described two cases of partial convulsion affecting an ocular muscle. One was that of a man aged 36, whose attacks began with a sensation spreading from the inner canthus of the left eye over the borders of the orbit to the temple. This was followed by dimness or loss

of sight in both eyes, accompanied by a movement outwards of the left eye, and sometimes a moment's loss of consciousness. If walking, he deviated to the left during the attack, probably from erroneous projection of the left field of vision. The attack lasted only for a few seconds, but returned many times daily. Except slight amblyopia of the left eye, there was no permanent nervous symptom. The other case was that of a man aged 47, with slight weakness of both internal recti and the left external rectus. In the attack, there was spasm of the last muscle, blinking of both eyes; and the attack, which lasted only a few seconds, was followed by slight ptosis of the left upper lid for a few minutes. There was never loss of consciousness, and there were no other nervous symptoms. Lastly, a case of convulsive nystagmus was described. The patient, suffering from Bright's disease, died a few hours after the onset of apoplectic symptoms; and, *post mortem*, there was an anæmic area in the mesial half of the right side of the pons above the nucleus of the sixth, and extending from near the floor of the fourth ventricle to just in front of the fillet. There were conjugate deviation of the eyes to the left, and paroxysms of increased deviation, accompanied by nystagmus, with quick movement of the legs. It was pointed out that the deviation, although corresponding to the paralysing effect of the lesion, was increased by irritation of the unaffected centres in the left half of the pons, to which the nystagmus must be ascribed. The case showed that both spasm and paralysis may coincide in causing a secondary deviation, and also the importance of attending to the direction of the quick movement in nystagmus.

*A Scheme for Diminishing the Number of Cases of Blindness due to Ophthalmia Neonatorum.*—Dr. David McKeown (Belfast), gave a summary of a paper which he had circulated among the members of the Society, "On the Prevention of Blindness from the purulent Ophthalmia of Infancy, and in Particular on the Utilisation of the Poor-Law and Birth-Registration Organisations of the United Kingdom for that Purpose." Ophthalmia neonatorum was the most fruitful source of blindness, and a vast number of persons had lost from this disease one eye, or had had the vision of one or both eyes permanently impaired. Delay in seeking medical relief was the essence of the question, and arose from want of knowledge (on the part of the public)

of the dangerous character of the affection. He proposed to instruct those in charge of new-born infants by a card of directions, in these terms:—"If the child's eyelids become red and swollen, or begin to run matter, within a few days after birth, it is to be taken, without a day's delay, to a doctor. The disease is very dangerous, and, if not at once treated, may destroy the sight of both eyes." This card should be distributed by the Government in the following way: 1st. By the utilisation of the Poor-Law organisation of England, Ireland, and Scotland as follows: In England the relieving officer, and in Scotland the inspector of the poor, should in every case of labour under the Poor-Law system, read to and leave with the person obtaining the order for medical aid, or the person in charge of the patient, a copy of the card. In Ireland the card should be attached to the order for medical aid in such cases, and the person who gives the order and card should, before doing so, read the card to the applicant. 2nd. The registrar of births should read and hand to each person registering a birth a copy of the card. Much could be done by the profession to spread the necessary information. The etiology, progress, and treatment of ophthalmia neonatorum, and the duties of the medical attendant, should be fully dealt with in every textbook and every course of lectures on midwifery; and for the instruction of midwives, their handbooks, all the institutions where women were trained as midwives, and the various charitable organisations which employ midwives, should be utilised. Dr. McKeown stated that the Saxon Minister of the Interior had issued instructions to midwives and monthly nurses on the subject, and that two voluntary societies in this kingdom had taken some steps in the matter, and it had been suggested to ask the registrars of birth to distribute papers. He, however, pointed out that in instructing the public generally only Governmental agency could be effectual. He proposed that a deputation should wait on the Government officials.

Mr. Tweedy felt satisfaction that opportunity had at length occurred for bringing forward such a proposition, but humiliation that it had taken shape so late. It had been estimated that, of the persons in the blind-asylums, fully 30 to 40 per cent. were blind owing to purulent inflammation in infancy. In twenty-two asylums in Germany, between 1865 and 1874, the



number was found to amount to 40 per cent. In his experience, when cases of purulent ophthalmia could be seen early enough, provided the cornea be clear, no case would be lost; and in this statement he would include diphtheritic ophthalmia. Correct ideas were no doubt spreading slowly through the community, and it was the duty of a society such as the Ophthalmological Society to step in and encourage the spread of such knowledge.

The President said that the subject was one of great importance, and the Society were indebted to Dr. McKeown for bringing it forward. He had considered the matter carefully, and did not think that the passing of resolutions, such as those suggested, came properly within the scope of the Society; he thought it would be better that the subject should be referred to a committee.

Mr. Frederick Mason, after alluding to the great importance of the subject, moved that a committee be appointed to consider the whole subject, and report to a subsequent meeting.

Mr. Nettleship seconded the motion.

The following were nominated to act as a committee:—Mr. Mason, Dr. Fitzgerald, Dr. Argyll Robertson, Mr. Carter, Mr. Priestley Smith, Mr. Nettleship, Mr. Tweedy, Mr. Gunn, Dr. McKeown, and the President and Secretaries *ex officio*.

*The Therapeutic Value of Jequrity.*—Mr. Arthur Benson gave the results of a clinical investigation into the mode of action of jequirity. He had found that the ophthalmia could be produced by (1) the freshly powdered seeds; (2) the freshly made infusion; (3) the infusion after bacilli had grown in it; (4) the infusion six weeks old, and swarming with micro-organisms of most varied types; (5) the infusion after these bacilli had ceased all motion, and had sunk to the bottom of the liquid, apparently dead. He had examined at all stages of the disease the discharges and membranes from eyes affected with jequirity ophthalmia, without ever seeing the typical bacillus. The discharges and membranes were entirely devoid of infective qualities. He was thus able to confirm the results of Dr. Klein's recent researches. Mr. Benson used the fresh infusion made from the seeds not decorticated, but passed through a coffee-mill. He had a high opinion of the value of

the treatment in granular lids, and had never seen any serious injury result from its use. In one case, there was a short attack of iritis after each application, and in others some infiltration of the cornea occurred. (*Vide p. 106.*)

*Living Specimens.*—Mr. R. M. Gunn exhibited a little girl, aged eleven years, in whose retina could be seen a direct arterio-venous communication. She had come under observation for headaches, from which she had suffered for four years. On examining the left eye, it was seen that a branch of the inferior temporal vein sent an offshoot which ran directly into the superior temporal artery. Several of the retinal veins appeared to commence abruptly, doubtless having their origin in the choroid, and piercing the retina vertically.

Dr. Ormerod showed a man, aged 44 years, suffering from paresis of the upward movement of the eyes. It was most marked in the right eye, especially when the patient looked to the right. There was vertical nystagmus when he tried to look upwards. The other ocular movements were normal, no definite neuritis. The symptoms had been present ten months, but he had a similar condition fifteen years previously.

Mr. Streatfeild showed a man, aged 22 years, the subject of inherited syphilis, who had had disease of the bones of his face since the age of fourteen, leading to eversion of the lower lid on the left side, the cornea being clear when he came under observation. A raw surface having been made beneath the lid, a piece of skin was transplanted from the forearm, with antiseptic precautions. The upper half lived, and the deformity was much diminished.

Mr. G. E. Walker showed a patient treated for sympathetic ophthalmia by removal of a portion of iris.

Mr. Power feared that cases in which sympathetic ophthalmia was confined to the iris were very rare, and was of opinion that it was only in such cases that any operation on the iris could restore sight.

Mr. F. Hodges showed a girl, with an irregular granular-looking body on the outer sclera, which had first been noticed in the outer ciliary region, its formation being followed by iritis, hypopyon, and perforation of the sclera. It was probably tubercular.

Mr. M. M. McHardy showed a man with a persistent hyaloid vessel in the right eye, and choroido-retinal changes attributable to inherited syphilis.

Mr. Cowell showed a woman with a new growth, presumably sarcoma in the region of the ciliary body.

*Card Specimens.*—Mr. Adams Frost exhibited a new artificial eye. The lens had a focus of 40 millimetres, which could be shortened or lengthened at pleasure. There were two retinae, one of ground glass graduated in millimetres, the other representing the normal fundus. There were two clips in front to hold lenses.

Mr. G. L. Johnson exhibited an improved trial frame contrived to secure greater accuracy and perfection in adjusting spectacles and estimating refraction.

Mr. A. Stanford Morton showed a drawing of a case of hæmorrhage into the macula, and hoped to be able to exhibit the patient at the next meeting. There was no history of a blow, nor any evidence of disease beyond rheumatic gout, the last attack of which had occurred a year earlier; the urine gave no evidence of disease.

Mr. Nettleship exhibited the following drawings: 1. Central areolar choroidal atrophy. 2. Central senile guttate choroiditis (Tay's choroiditis). 3. Syphilitic retinitis, with retinal hæmorrhages, and growth of new blood-vessels from the disc into the vitreous humour. 4. Glaucoma with retinal hæmorrhages, thickening of retinal veins, and obliteration of arteries. 5. Nævus (?) lymphatic, affecting the brow, orbit, and exterior of the eyeball, with lamellar cataract. No cataract in the other eye.

Mr. Gustavus Hartridge showed a drawing of a case of tumour of the choroid.

Mr. Arthur H. Benson (Dublin) exhibited the following ophthalmoscopic drawings: 1. A case of monocular coloboma of the iris-lens and choroid, with a bridge of iris-tissue over the coloboma. 2. Central choroiditis, monocular, pigmented. 3. Central choroiditis and retinitis, binocular, slightly pigmented. 4. Choroido-retinitis, extensively pigmented. 5. Choroiditis (myopic) extensively pigmented. 6. Thrombosis (sembolism) of central artery of retina.

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## REFLEX AMBLYOPIA.

BY PRIESTLEY SMITH.

Much uncertainty exists as to the true significance of those forms of amblyopia which are described under the names Retinal Anæsthesia, Hysterical Amblyopia, Reflex Amblyopia, and Neurasthenic Amblyopia. The characteristic symptom, *concentric contraction of the field of vision without ophthalmoscopic change*, is well known, and, since the introduction of the perimeter, has been carefully studied; but how this symptom is brought about remains at present an open question.

Speaking of "retinal anæsthesia" (Graefe-Saemisch, Vol. V., p. 981), Leber points out the close resemblance which exists between cases in which a blow upon the eye is manifestly the cause, and cases of so-called spontaneous origin. He allows that in the former class the disturbance lies in the retina itself, but goes on to say that in the spontaneous forms, the hysterical especially, such a localisation seems improbable, and gives grounds for assuming a more central disturbance in these cases. He retains the name "anæsthesia of the retina," not as indicating that the retina itself is necessarily at fault, but as a convenient generic name for a group of conditions which require further elucidation.

Charcot, as is well known, has referred concentric contraction of the field of vision to a disturbance in the course of the optic fibres in the brain, and has framed an anatomical hypothesis to account for the connection.

Ferrier's experiments have given some support to Charcot's position, inasmuch as they have tended to show that a lesion on one side of the brain may cause (in the monkey) blindness of the opposite eye. His

assertion on this point stands at the present time as follows:—"Unilateral destruction of the cortex of the angular gyrus causes temporary abolition or impairment of vision in the opposite eye—not of a hemiopic character" (*vide* O. R., March, 1884, p. 80).

In opposition to the idea of a cerebral origin for a concentric contraction of the field of vision must be ranged all those writers who hold, with von Graefe, Mauthner, and the majority of German authorities, that the optic fibres undergo a semi-decussation at the chiasm and do not again change sides deeper in the brain. This anatomical arrangement necessarily implies that loss of vision due to lesion of the optic fibres at any point behind the chiasm *must* be of hemiopic character. An admirable analysis of the evidence bearing on this question has lately been given by M. A. Starr (*vide* O. R., March, 1884, p. 77).

In a recent paper on Thrombosis of the Retinal Artery and Reflex Amblyopia (O. R., Jan. and Feb., 1884, p. 45, etc.) I gave clinical reasons for the belief that the visual defect in neurasthenic asthenopia is due to malnutrition of the retina. In the present paper I propose to examine this question more closely. The propositions which I desire to maintain are—

1. That concentric contraction of the field of vision in man is, in all cases, a sign of loss of function in the retina.

2. That hysterical amblyopia, neurasthenic amblyopia, and sympathetic amblyopia are conditions of peripheral anæsthesia, due to reflex contraction of the vessels which nourish the retina.

It will be convenient to speak of the doctrine which refers concentric contraction of the field to lesion of the optic fibres in the brain as the *central hypothesis*, and that which refers it to the retina as the *peripheral hypothesis*.

In the first place, it may be asserted that the central hypothesis is opposed to physiological probability, for it

implies a want of analogy between the visual function in man and in the lower animals, and a further want of analogy between the visual function and the other sensory functions.

In certain of the lower animals the eyes, like the limbs, act independently of each other. In the cod-fish (Fig. 1. *a.*) the right eye sees exclusively to the right side of the body, the left eye exclusively to the left side; the right eye is connected exclusively with the left half of the brain, the left eye with the right half of the brain (Gudden von Graefe's Archiv. XX., II., p. 250). In man (Fig. 1. *b.*) the eyes are directed forwards, and cover to a large extent the same area in space, thus giving him a higher development of the visual function—stereoscopic vision. The right eye is no longer a complete organ for

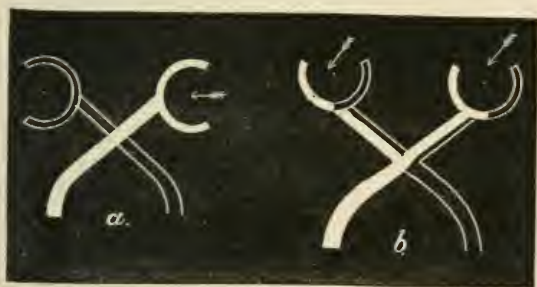


FIG. 1.—Shows diagrammatically the direction of the eyes and the decussation of the optic fibres—*a.* in the cod-fish, *b.* in man.

vision towards the right, nor the left a complete organ for vision towards the left. The left halves of the two retinae see to the right, the right halves to the left, and if the representation of visual impressions in the brain is to be alike in the man and the fish, the left halves of the two retinae must be connected with the left half of the brain and *vice versa*; in other words, there must in man be a semidecussation of the optic fibres at the chiasm.

A lesion in the left half of the brain causes loss of sensation and motion on the right side of the body. If such a lesion is to affect the visual function in a similar

manner, that is to say, if it is to cause blindness towards the right side, it must blind not the right eye but the left halves of the two retinae. And just in the same way, if we regard the functional purposes of the eyes rather than their anatomical position, we must look for loss of conjugate movement of both eyes towards the right, and not for paralysis of the muscles of the right eye, as the analogue of the loss of movement in the right arm and right leg.

As far as positive evidence goes the analogies referred to above are confirmed by actual structural arrangements. Semidecussation of the optic fibres in the chiasm is an anatomical fact. Those, therefore, who maintain the central hypothesis must accept the onus of proving the existence of an anatomical *disarrangement* of which we have no direct evidence and which implies a want of analogy between the cerebral representation of visual impressions and that of other impressions.

The foregoing consideration deals with *a priori* and presumptive reasons against the central hypothesis. There is also a mass of clinical evidence pointing in the same direction. This need not be reviewed here, for it is very fully discussed in the recent article by Starr already referred to (*vide* O. R., March, 1884, p. 77). Starr's conclusion is that a lesion involving the optic fibres at any point behind the chiasm produces impairment of vision of a hemianopic character. This is an absolute denial of the hypothesis that such a lesion can produce concentric contraction of the field of vision. Starr does not, however, attempt to explain the undoubted fact of the occurrence of such concentric contraction together with hemiplegia and hemianæsthesia.

In the next place, it will be well to glance at certain presumptive reasons which favour the peripheral hypothesis. These are to be found in the fact that concentric contraction of the field of vision is, in certain well-known disorders of the eye, clearly attributable to a disturbance in the retina itself,

Moderate finger pressure upon the eyeball induces, after a few seconds, a concentric contraction of the field of vision of a remarkable kind. A veil or mist appears to obscure all objects except those situated at or close to the point of fixation. By such an amount of pressure as can safely be made upon the eye it is not possible to totally suspend function in any portion of the retina—the impairment appears to consist rather in an increased liability to exhaustion of function; an object remaining pictured upon the same spot of the retina is rapidly lost sight of, but returns instantly to view if by a slight movement either of the eye or of the object itself, its picture is brought upon a fresh spot.\* A very similar tendency to rapid fatigue characterises those forms of amblyopia which form the subject of this paper.

Chronic glaucoma induces a more or less concentric contraction of the visual field; the irregularities of form often met with in this disease are probably due to the fact that, together with a gradual centripetal failure of retinal nutrition, there is much disturbance of the nerve fibres at the disc.

Retinitis pigmentosa presents a typical concentric contraction of the field associated with degenerative changes in the retina; the centripetal march of the blindness is the expression of failing nutritive relations between the capillary plexus of the choroid and the external layers of the retina.

Blows upon the eye, in a certain class of cases in which no structural change either internal or external is discoverable, impair the field of vision in a remarkably concentric manner (Leber's Traumatic Retinal Anæsthesia). During the first few hours after the blow the eye may be completely blind, or there may be a slight perception of light exactly at the centre of the retina;

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An account of an experiment on this matter with a special apparatus, and a figure of the apparatus, are given in my work on "Glaucoma: its causes, &c.," 1879, p. 88. I have repeated the experiment by simple finger-pressure and the perimeter with similar results.



day by day the sentient area increases in all directions outwards from the fixation point, and at the end of a week or ten days it has recovered its normal dimensions. I have lately examined three such cases with the perimeter (Fig. 2). The expanding field of a traumatic case undergoing recovery is the counterpart of the contracting field in a progressive retinitis pigmentosa or glaucoma. In each we see that *the proneness to loss of functional activity is greatest at the periphery of the retina, least at the centre.*

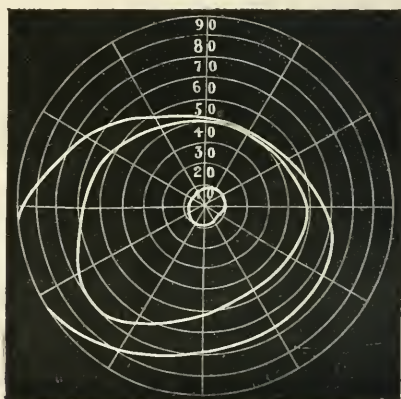


FIG. 2.—Shows the dimensions of the field on the 2nd, the 6th, and the 9th day after the injury, in the case of Mary B., aged 46 (L788), who came under care on March 20th, 1884, 12 hours after receiving a blow on the left eye. The media and fundus oculi appeared perfectly normal throughout. The disproportionate limitation at the upper part of the field was due to a prominent brow.

The explanation of this diminution of resistance from the macula lutea towards the ora-serrata is to be found in the arrangement of the blood vessels, by which the functional activity of the retina is maintained. It is a well-established fact that the retina receives its nutrient supply from the vessels of the choroid as well as from its own proper vascular system. Leber, Max Knies, and Schneller, the latter of whom especially has studied the question very minutely (von Graefe's Archiv., XXVI., I., p. 1), agree that the outer layers of the retina are

nourished by the capillaries of the choroid. These capillaries, lying immediately beneath the pigmented epithelium, maintain the nutrition of the latter ; and the pigmented epithelium keeps the rods and cones in a state of functional activity. Impaired nutrition of the pigmented epithelium involves an impaired response on the part of the rods and cones to the stimulus of light. The fibre-layer and ganglion-layer of the retina are nourished chiefly by the retinal vessels. The proofs of these assertions may be found in the article by Schneller, referred to above ; it is unnecessary to give them here. The important point in connection with concentric contraction of the field of vision is that the blood supply which nourishes the retina, especially that furnished by the choroid, becomes progressively less and less abundant from the posterior pole to the anterior limit. The mesh-work of the chorio-capillaris is closest and richest in the region of the macula, and becomes less and less close as it passes forwards to the ora-serrata, where it terminates (Leber. Graefe-Samisch, Vol. II., p. 318). This arrangement is completely in accordance with the varying importance of the corresponding zones of the retina, and it seems to involve, as a natural consequence, that an impairment of the nutrient supply should reveal itself by a concentric contraction of the field of vision.

There is then a strong presumptive reason for supposing that concentric contraction of the visual field is under all circumstances a sign of disturbance in the retina itself. We have now to consider the objections to this supposition—the objections to the “peripheral hypothesis.” The chief difficulty is that the symptom in question is associated in certain cases with other nerve-symptoms which suggest a central disturbance ; it frequently occurs together with the hemi-anæsthesia and hemi-analgesia of hysterio-epilepsy. This difficulty, I venture to think, disappears entirely on closer examination.

Figure 3 represents in a diagrammatic manner the peripheral distributions of nerve fibres belonging to the cerebro-spinal and sympathetic nervous systems respectively. Having regard to their central origin we see that the nerves of the skin and mucous membranes



FIG. 3.—Shows diagrammatically the distribution of cerebro-spinal and sympathetic nerve-fibres to R R the retinae, F the face, E E the extremities. The continuous lines represent cerebro-spinal nerves, the dotted lines sympathetic nerves, A A median line of the body.

of the right side of the body are associated, in the cerebro-spinal system, with the analogous portions of the visual apparatus—the left retinal halves. The sympathetic system, on the other hand, following the

distribution of the blood vessels, associates the right leg, arm, and mucous-membranes with the right eye in its entirety. A left cerebral lesion (at L) will cause hemi-anæsthesia on the right side and blindness towards the right,—hemianopia ; an excitation of the sympathetic system on the right side will contract the arterioles and lower the circulation in the right arm, leg, and mucous-membranes, and in the right eye. Is it not probable that the hemi-anæsthesia which occurs with amblyopia of the eye of the same side is the expression of a disturbance in the sympathetic system, causing a widely-spread spasm of arterioles and consequent *peripheral* anæsthesia? The retinal anæsthesia can, as we have already seen, be satisfactorily explained only by assuming a lowered blood supply to the eye; the cutaneous anæsthesia may, from the anatomical standpoint, be equally well accounted for by the assumption of a central cerebral disturbance, but clinically we have evidence that the blood supply to the skin is actually diminished. In the anæsthesia and analgesia of hystero-epilepsy it is often seen that the pin-prick which is employed to test the condition fails to draw blood on the affected side whilst readily doing so in the opposite limb. (Buzzard. Quain's Dictionary of Medicine, p. 681, &c.)

If this solution be the true one the retina assumes a high importance as an indicator, distinguishing between disturbances in the sympathetic and cerebro-spinal systems. In the skin and mucous-membranes the terminal distributions of the two systems cover identical areas, and the effects produced by disordered function are not distinguishable by their locality; but in the retina the terminal distributions are sharply contrasted, and disordered function declares itself in the one case by hemianopia, in the other by concentric contraction of the field. This distinction does not, of course, imply that in disorders of either kind the disturbance is *limited* to one or other group of nerves ;

hemianopia may arise from vascular spasm involving the visual area in the brain, and concentric amblyopia is frequently a reflex result of impressions received by the cerebro-spinal nerves. In either case the symptom denotes suspended action in a cerebral nerve, but the *form* in which it occurs distinguishes between a central and a peripheral loss of function, and may, I suggest, be employed as an index to the probable origin of simultaneous loss of function in other areas of the body.

For certain forms of anæsthesia and paralysis a peripheral causation, such as the foregoing considerations appear to indicate, was asserted by Brown-Séquard, but the doctrine appears to have gained a very limited acceptance. Possibly the evidence obtainable from the retina may lead to a different verdict.

Two other apparent objections to the "peripheral hypothesis" must be mentioned. Our reluctance to ascribe the failure of vision to a failure of nutrition in the retina has probably been largely due to the fact that we commonly detect no ophthalmoscopic changes in the retinal arteries. With regard to this it must be remembered that the finer ramifications of the arteries and the capillary plexus of the retina are entirely beyond the reach of our observation, and also that changes of small amount, such as slight reduction of the arteries, fulness of the veins, pallor of the whole fundus, and even slight œdema around the disc, *are* sometimes discoverable. But a weightier reply than this can be made to the objection. Analogy with well-known ocular diseases shows that it is the rods and cones rather than the conducting fibres which are chiefly at fault in this form of amblyopia; the rods and cones are nourished by the chorio-capillaris, not by the central vessels of the retina (*vide* p. 134). It is not necessary to suppose that the vaso-motor spasm affects one district of the eyeball more than another—it will tell most where circulation and nutrition are most active; a very slight effect in the true retinal circulation is likely to be paralleled by a

much more marked effect in the choroid. The activity of the choroidal circulation is not readily estimated by ophthalmoscopic examination.

Finally, we have to meet Ferrier's statement that a lesion of the angular gyrus in the monkey may cause temporary abolition or impairment of vision in the opposite eye—not of a hemiopic character (*vide* p. 129). Hemiopia in a monkey would, I presume, imply rather more blindness in the "opposite eye," and rather less in the eye on the same side, than in man, in accordance with the somewhat greater divergence of the axes of the globes, and would, by so much, be more difficult of detection than in man. Seeing that even in man the hemiopic condition reveals itself with certainty only to a careful examination in which the patient assists, the determination must be a matter of great difficulty in the monkey. If, however, Dr. Ferrier's observation on this point amounts to certainty, then I would suggest that the failure of vision—a *temporary* failure, as he expressly states—may be, in whole or in part, a reflex retinal anæsthesia produced in the manner described above by the agency of the vaso-motor system. There is ample evidence that the starting point of such reflex action may lie in the brain as in other parts of the nervous system. A temporary abolition of function corresponds better with what we see in reflex amblyopia than with the known clinical results of a lesion situated in the course of the optic fibres in man.

The peripheral hypothesis has, then, no substantial difficulty to face, and finds a basis in physiology. There is, I think, good ground for the belief that concentric contraction of the visual field is at all times a sign of loss of function in the retina, and that in the several conditions which may be classed together under the name of "reflex amblyopia" this loss of function is due to reflex contraction of the choroidal and retinal blood-vessels.



In many cases of reflex amblyopia the contracted field presents a remarkable peculiarity ; the contraction rapidly increases whilst the eye is under examination. This fact was clearly pointed out and illustrated by Wilbrand in his recent paper on neurasthenic asthenopia (*vide* O. R., Jan., 1884, p. 10). I have been able to confirm Wilbrand's observations in almost every case of the kind which I have examined since reading his paper, and by adopting a somewhat different mode of mapping the field have obtained charts which exhibit in a very striking manner the tendency to rapid exhaustion of retinal function, upon which he has laid stress. Wilbrand moved the test-object across the entire field in each meridian, entering the field at the outer side and leaving it at the inner, and obtained a peculiar chart in which the defects became greater in each successive meridian but lay chiefly at the inner side of the field ; he then repeated the process with the same eye, traversing each meridian in the opposite direction, and so obtained a second chart in which the defects lay at the outer side. I have adopted the simpler plan of testing, as usual, from without inwards in each meridian, and going twice or more times round the field without interruption. On reaching the meridian from which one started the sentient area is always found to be smaller than at first, and in some cases a well-marked spiral figure is obtained (Figs. 4 and 5). It is difficult to imagine a more delicate or graphic indication of diminishing excitability in a nerve-organ than such a chart affords. With my own registering perimeter there need be no danger of confusing the pricks belonging to the first revolution with those belonging to the second ; it is only necessary to exchange the pricker usually employed, for an ordinary pin at the second round, and for a lead pencil if a third round be made. In such a spiral line we have a clear indication that the loss of sight in reflex amblyopia is essentially different in kind from that which occurs in hemianopia ; in the one case function is more or

less impaired throughout the whole field, and the sentient and non-sentient areas are separated from each other by a constantly shifting line expressive of insufficiency in the

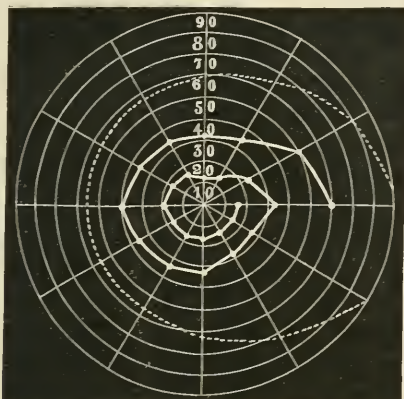


FIG. 4.—Field of vision of the right eye of Samuel B., *vide* Case 7, p. 146. The dotted line in this and the following chart shows the limit of a normal field.

nutrition of the retina to meet the demands made upon it; in the other case a completely normal area is separated from a completely blind area by a fixed and sharp line

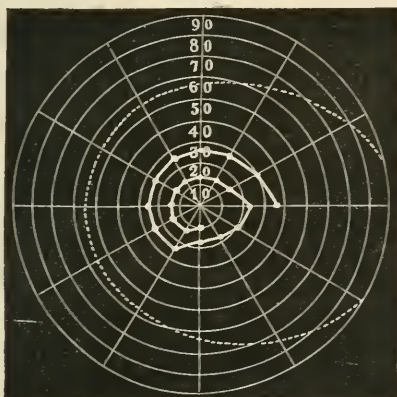


FIG. 5.—Field of vision of the right eye of Thomas T., *vide* Case 8, p. 147.

of demarcation expressive of the distinct anatomical connections of the two parts in the brain.

In some cases of reflex amblyopia the concentric contraction of the field attains its maximum by reaching the fixation point, and we have what appears to be a total abolition of vision; even in these cases, however, the condition is more often one of extreme depression of function than of total annihilation, for the pupil still responds to light, and sometimes if we modify the light stimulus by means of a blue glass the retinal pictures are again to some extent perceived. In such cases the idea of intentional deception is very apt to suggest itself, but it is beyond question that a blue glass often raises the acuity of vision considerably in reflex amblyopia, presumably by so altering the stimulus to the rods and cones as to diminish their liability to exhaustion, and it is not unreasonable to suppose that even when the retinal impressions have become so weak as no longer to reach the perceptive centres, some amount of conscious vision may be recovered by the same means. We know that the retina responds to blue when the intensity of the illumination is too feeble to excite sensations of any other colour (Helmholtz. *Physiolog. Optik.*, p. 317). Its ability to respond may perhaps be increased by protection from the more exhausting influence of the intenser stimuli.

In very many cases of reflex amblyopia there is contraction of the field in both eyes, sometimes equal in both, sometimes more marked in the one than in the other. In cases of so-called crossed amblyopia, Charcot found the greater visual defect on the same side as the tender ovary, while the other eye presented a slighter contraction of the field. This correspondence of side between eye and ovary finds a ready explanation in the theory of a reflex action influencing the retina through the sympathetic (see Fig. 3); the implication in a lesser degree, of the other eye, agrees with what we know of the tendency which vaso-motor action has to spread from one side of the body to another, and may be explained anatomically

by the intimate connections which exist between the sympathetic trunks of the two sides. When the contraction of the field is equal in the two eyes we may assume a more widely distributed exciting cause.

The following statement with regard to the action of the vaso-motor nerves, which I take from the chapter on the Vascular Mechanism in Michael Foster's text-book of physiology, will serve to show the variety of possible causes for reflex amblyopia :—The calibre of the small arteries, which forms one important factor regulating the flow of blood, is subject to influences proceeding from all parts of the body, the influences reaching the arteries in a reflex manner by means of the vaso-motor centre, the afferent impulses being, for the most part, carried by ordinary sensory nerves, while the efferent impulses pass along special vaso-motor nerves which, though the vaso-motor centre lies in the medulla oblongata, have a great tendency to run in sympathetic tracts. The effects may be either local or general, the local being frequently opposite to the general, so that there is reason for assuming that the vaso-motor centre is a multiple centre, composed of minor centres governing particular vascular areas, so associated together that they may, according to circumstances, act either together or apart. The afferent impulses need not start from the peripheral nerve-endings, they may arise anywhere—as, for instance, in the brain ; thus an emotion originating in the cerebrum may either inhibit or exalt that portion of the vaso-motor centre which governs the vascular areas of the head and neck, and thus call forth either blushing or pallor. Changes may be induced in the vaso-motor centre itself, without the need of any impulses reaching it from without ; it may be directly affected by the condition of the blood passing through it. If the quantity of oxygen in the blood be reduced, the tonic action of the vaso-motor centre is increased, and a general arterial contraction takes place.

In these physiological facts we may, I think, find an explanation of two salient points in the etiology of reflex amblyopia, namely, that an impoverished state of the blood appears to predispose to the disease, and that the exciting causes appear to be of very various kinds.

The following brief notes of cases which have been under my own care during the last eighteen months will serve to illustrate some portion of the etiology of reflex amblyopia. *Spiral* contraction of the field was not looked for in any examination made before the beginning of December of last year, but in several of the earlier cases I found it on making a re-examination later. As a general rule a strong tendency to spiral contraction was accompanied by a high degree of amblyopia, a marked impairment of colour vision, and an almost total inability to use the eye continuously upon near objects, while an absence of this tendency was found to correspond with an improvement in these respects. I have by me the perimeter-charts of all the cases here recorded, and of several others of similar kind; I select for representation the two which show the most typical spiral contraction (Figures 4 and 5).

I would draw especial attention to Case 8; it proves that in one form at least of "sympathetic" disease we have a reflex amblyopia closely allied to the other varieties of the affection discussed in this paper. In no case were there any decided ophthalmoscopic changes; there was, I think, a tendency towards pallor throughout the whole fundus in one or two cases, but of this it is impossible to speak positively, as the only safe standard of comparison in any given case would be the same eye in the state of health. The pupils in all, or almost all, were large but very sensitive to light.

1. Mrs. W. (*vide* O. R., Jan., 1884, p. 2), aged 24; disease of ovaries and anæmia; one eye permanently blinded by thrombosis of retinal artery during fainting, the other temporarily blinded many times and field increasingly contracted until operation;



sight of second eye recovered after removal of ovaries and fallopian tubes (operation by Dr. E. Malins).

2. Frederick T. (L 39), aged 25 ; gardener ; hard worked and not well fed ; frequent flushing of face while speaking ; sexual irregularities excluded with tolerable certainty. A pot of pitch blazed up and scorched his face *very slightly* as he lifted it from the fire ; for some hours he could hardly open his eyes ; for several months contracted fields, amblyopia, inability to use the eyes on near objects, and pain, suffusion, and watering on attempting to do so. Some improvement from blue glasses, iron and strychnia, with rest, but cure not complete when he left the neighbourhood six months later. The cause in this case was probably the *shock* to an over-sensitive system rather than the burn *per se*. I have since examined the fields in two cases of *severe* burns of the face, one by burning tar, and found them normal in both.

3. Sarah O. (IV., 26), aged 20, nursemaid ; anæmia ; irregularities of catamenia and bowels denied, but replies probably not trustworthy ; appetite capricious ; never eats before mid-day. Severe tooth-ache three weeks ago ; two upper and one lower molar extracted by dentist ; great pain in face afterwards, and vision failed a day or two later. Amblyopia ; both fields much contracted ; *spiral* contraction. Acuity instantly doubled by blue glasses. Some improvement after a short use of iron and aloes ; regular and persistent treatment impossible.

4. Edwin B. (II., 277), aged 12 ; good health ordinarily, but of sensitive temperament and apt to be upset by slight errors of diet, excitement, fatigue, and other trivial causes, and then shows a marked pallor of the face ; has at times shown signs of cerebral irritation suggesting presence of intestinal worms, but no worms discovered ; six years ago was under my care for convergent strabismus, the amount of which varied to an unusual extent, with changes in general condition ; slight hypermetropia ; strabismus cured by tenotomy, and spectacles worn since. For a year or more has had occasional attacks of dimness of vision, during which he cannot see to read the largest print even with glasses ; such attacks appear to be induced by fatigue, excitement, or stomach disturbance ; examined when such an attack was passing off, V  $\frac{1}{50}$  barely, and *spiral* contraction of fields.



5. Rosina G. (L 229), aged 8, a pretty, rosy-faced little brunette, short, but with the face of a girl several years older, extremely precocious and quick at learning, has progressed rapidly at a Board School; much headache lately, often with giddiness, sleeplessness, and latterly inability to see to do her lessons; no hypermetropia; great contraction of both fields varying in amount from week to week and with strong *spiral* tendency. Discontinuance of all study and a month in the country produced much improvement, but fields still contracted when last examined.

6. Florence S. (L 543), aged 10, a sensitive and clever child living in a wretched home, the father drinking and out of work, the mother and children ill-fed; has done well at the Board School, but has now constant headache, little sleep at night, and almost total inability to read; no hypermetropia; *spiral* contraction of both fields. An arrangement by which the child had a good dinner and spent some hours daily for some weeks at a comfortable house produced marked improvement; fields enlarged and lost the spiral tendency; she now without much difficulty works half-time at school.

7. Samuel B., aged 37, under care of Dr. Simon at General Hospital, and sent to me for examination as to loss of sight; "no physical signs of disease of any kind, and no symptoms of organic mischief in brain or elsewhere." Married, and has six children; syphilis denied; sexual relations spoken of without reserve, and excessive indulgence excluded with tolerable certainty. States that 13 years ago he had a stroke causing loss of speech and loss of movement in *left* arm and leg for three weeks; recovered completely; health usually good until three months ago; seized with giddiness in chapel; had to be taken home; 12 hours later bad pain at back of head; in bed seven weeks; no loss of consciousness and no loss of movement in limbs, but so giddy that he could not walk across the room; sight very bad all the time. Is now able to walk, but frequently staggers; right eye  $V = \frac{1}{50}$ , well-marked spiral contraction of field (Fig. 4), left eye  $V = \frac{2}{50}$ , field rather larger than in fellow eye, with similar spiral contraction. (It is worthy of note that this patient gave a history of loss of speech—*i.e.*, disturbance in left cerebral hemisphere—with loss of movement in *left* arm and leg; this would favour the idea that

the by-gone "stroke," like the present amblyopia, was a vaso-motor disturbance affecting one side of brain and body.) (See Fig. 3.)

8. Thomas T. (L. 6), aged 41, coal miner, referred to me by a surgeon in a neighbouring town, March 28, 1884, for second opinion. Left eye struck by piece of coal November 3, 1883, nearly blinded at once and painful; excised January 28, 1884. Right eye began to water and scald and shun the light several weeks before excision of left, but got strong and clear a few days after excision; same symptoms returned soon after leaving hospital a week or two later, and have continued on and off ever since. Patient is thin and pale, with refined, sensitive facial expression; a very light sleeper. Remaining eye not injected, media clear, no trace of punctate keratitis; fundus normal, but perhaps rather pale. Marked spiral contraction of field of vision. (Fig. 5.)\*

## CASE OF PRIMARY ORBITAL CELLULITIS: DEATH ON SEVENTH DAY.

### POST MORTEM EXAMINATION.

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This case occurred in the hospital practice of Dr. Glascott, and to his kindness I am indebted for the privilege of publishing it.

Richard H., aged 48, an iron planer, came to the out-patient department of the Manchester Royal Eye Hospital, on July 2nd, 1883, with slight protrusion of the left eye, with a little injection and effusion of serum in the conjunctiva covering the lower part of the globe. The serious nature of the disease was not then evident, and he was ordered a mild astringent lotion of lead, to be used hot. On the following morning I found him amongst

\* Just as these pages are going to press I receive from Dr. Swan M. Burnett the record of a remarkable case of reflex amblyopia and other reflex phenomena following gunshot injuries. The symptoms, though somewhat differently viewed by the author, fall in, I think, most completely with the theory here advocated of a retinal anæsthesia and a peripheral paralysis and anæsthesia in the limbs due to action of the sympathetic nerves of the affected side. A condensed account of the case is given at page 156.

the out-patients, sitting with his head supported upon his hand, and as the swelling of the conjunctiva of the globe had now extended to the upper lid, and the proptosis was more marked, I ordered him into the house. On admission, about five o'clock that afternoon, he was at once sent to bed, and as he complained of a good deal of pain in the head a hypodermic injection of one-third of a grain of morphia was administered. He said that his eye had been bad for six days; he had had no blow or fall to account for it. The next morning, the seventh day of the disease, he dressed himself and went down to breakfast with the other patients; at 9.30 a.m. the nurse called me to him. The *right* eye was now in a nearly similar condition to the left, namely, a marked proptosis, but no injection of the conjunctiva, the upper lid tense and swollen. The left eye was much worse, being greatly protruded and perfectly immoveable; the upper lid hard and brawny-red; the cornea was uncovered only with great difficulty. The effusion of yellowish serum was much greater, but the cornea and iris were bright and healthy in appearance. The patient was now slow in answering questions, but gave correct answers if spoken to loudly; he complained of great pain in the head; temperature in the axilla  $103^{\circ}$ . He was at once got to bed, the head shaved, ice bags applied, and one drop of croton oil administered. A nurse was placed in constant attendance. I was summoned to the ward at 12.15 noon and found the patient convulsed and asphyxiated, with great venous engorgement of face and neck; respiration had ceased; the radial pulse could be felt for perhaps two minutes after respiration ceased, and then he died.

The wife stated that he had always been a strong, healthy, and active man, had never had any serious illness, and had worked up to the day he first attended at the Hospital. Six years ago he fell and hurt his nose, breaking the skin slightly, and six years before that he sustained an injury to the left hand which left two fingers stiff and useless. His memory had always been rather defective, but had been no worse lately. She described the eye affection as commencing as a little blister on the lower lid, no bigger than a pin's head; this broke and discharged a little fluid two days before we saw him.

The body was examined 26 hours after death in the presence of Mr. A. H. Young and Dr. Glascott. The redness

of the lids and protrusion of the eyes had almost disappeared. There were no adhesions of the dura mater; the sinuses both at the vortex and at the base were all distended with black clotted blood. The cavernous sinus on each side and the transverse sinus were of course especially noted, and the plugging of the latter readily explained the extension of the symptoms to the right orbit. There was no effusion of lymph or fluid at the base of the brain. The roof of the left orbit was removed, and the plugging was found to extend apparently to all the branches of the ophthalmic veins. The tissues of the orbit, removed *en masse* and dissected, showed signs of an intense inflammation, with traces of a creamy fluid which looked like pus, but which, unfortunately, was not examined microscopically. In the right orbit the only change found was general venous thrombosis. The brain was carefully examined, but no sign of disease was noted either in the arachnoid or pia-mater, or in the substance of the brain itself. The examination of the head was completed by opening the bony walls of the internal ears, and satisfying ourselves that they were healthy. The entire left lung was full of dark blood which freely exuded on section; the right lung seemed normal; there was no consolidation of either lung or affection of the bronchial tubes. The right side of the heart was full of dark clotted blood extending into the pulmonary artery.

Sections from some half dozen different pieces of the orbital tissue from the left side were examined microscopically, and showed the veins all plugged with blood corpuscles closely massed together; but one could distinguish in all the form of the corpuscles, showing how recent the process of thrombosis had been. No infiltration of the coats of the veins was made out. All the sections showed a large quantity of extravasated red blood corpuscles, especially numerous immediately around the veins. There were also several clusters of pus corpuscles distributed among the tissues. The nerves, arteries, and muscular fibres were unchanged. A very small quantity of fine nuclear connective tissue, apparently of recent formation, could also be demonstrated. Longitudinal sections of the optic nerve were examined, and appeared quite normal.

The view I take of this case is that there was firstly a phlegminous inflammation of the left orbit; secondly

thrombosis of the ophthalmic vein extending to the sinuses of the dura mater by way of the cavernous sinus. The sudden protrusion of the *right* eye was due to the plugging extending across the transverse sinus, and consequent effusion of serum into the orbital tissues. The immediate cause of death was, no doubt, thrombus of the pulmonary artery, derived directly from the brain sinuses, the extension taking place by way of the jugular veins.

Primary orbital cellulitis is a rare disease in healthy adults; a mild form is by no means uncommon in delicate children, and speedily disappears under treatment. Berlin, in his exhaustive article on inflammatory affections of the orbit (Graefe-Saemisch, Vol. VI.), dwells at some length on the occurrence of thrombosis of the ophthalmic vein in orbital cellulitis. He states that even when this has taken place, resolution may occur, or fatal pyaemia be set up without the process of thrombosis extending beyond the orbit; or, lastly, sinus-thrombosis may supervene as in the above recorded instance. This third termination, Berlin says, can be diagnosed with certainty if, during the course of the disease, the other eye becomes protruded along with conjunctival congestion and more or less fixation of the globe. Retardation and stagnation of the blood in the veins must occur in all cases of acute orbital cellulitis, and I am of opinion that the fatal result in the present case was due to the early occurrence of the process before the swelling and infiltration of the tissues had produced closure of the venous outlet.

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**GALEZOWSKI (Paris).** The Different Forms of Retinal Detachment and their Treatment. *Recueil d'Ophthalmologie*, December, 1883, p. 694—January, 1884, p. 46.

(Continued from p. 89.)

In the large majority of cases the occurrence of actual detachment is preceded by certain prodromal symptoms. These are of a kind which indicates a deep-seated congestion of the eye. The most important are periodical obscurations of vision,

simulating a veil or a mist rising or falling in front of the eye, and momentarily obscuring the objects looked at. When this phenomenon recurs at very frequent intervals, detachment of the retina may be expected shortly. Subjective luminous sensations, such as sparks or balls of fire, appearing in various parts of the field, are a frequent indication of the choroidal congestion, and are supposed to be due to the pressure of the engorged vessels upon the retina. Subjective colour-phenomena of a similar kind, and due to the same cause, are also often met with.

There is, the author thinks, some analogy between these premonitions of retinal detachment and the early symptoms of glaucoma, and an iridectomy performed during this stage might probably in some cases avert the disaster (*vide* p. 156). He urges that it is chiefly by a careful study of the predisposing causes of the disease, and by the adoption of rigid preventive measures before the occurrence of actual detachment, that patients are likely to be benefited. In the following table of the cases observed by himself, certain of the etiological relations of retinal detachment are well illustrated:—

#### SYNOPSIS OF CASES OF DETACHMENT OF THE RETINA.

Total.	Males.	Females.	Right Eye.	Left Eye.	Both Eyes.	Emmetropia and Hypermetropia.
649	410	235	270	231	50	51

#### *Frequency according to Age.*

Age 1—10.	10—20.	20—30.	30—40.	40—50.	50—60.	60—70.	70—80.
2	26	78	109	121	169	115	24

#### *Accidental and Occasional Causes.*

Injury.	Operation for Cataract.	Pregnancy.	Syphilis.	Rheumatism.	Albuminuria.	Diabetes.	Erysipelas of Face.	Anger/Fright.	Tooth Extraction.	Sympathy.	Facial Neuralgia.	Choroidal Sarcoma.
61	13	7	13	7	5	2	2	5	2	3	9	9

#### *Complications.*

Iritis.	Iridocho- roiditis.	Glaucoma.	Choroidal Atrophy.	Choroidal Exudation.	Hæmorrhage into Retina or Vitreous.	Opacities floating in Vitreous.	Rupture of Retina.	Cataract.
57	16	2	64	27	27	120	131	112



*Sex* exhibits an important influence, males being attacked nearly twice as often as females. The cause of the difference is probably to be found in the closer application of the eyes involved in some of the occupations of men, such as engraving, painting, the use of optical and other scientific instruments; in short, all occupations involving prolonged use of the eye with accommodative effort. When premonitory symptoms arise such use of the eyes must be absolutely interdicted.

*Myopia* is, of all predisposing conditions, by far the most important. While emmetropia and hypermetropia were found in only 51 cases, amongst which were many of accident, myopia was present in no less than 598. The state of the refraction appears to exercise considerable influence also upon the manner in which the detachment occurs; in myopes it often takes place suddenly, and even instantaneously, while in emmetropes and hypermetropes it develops much more gradually, and is often preceded by a gradual diminution of vision. In both classes, however, it is, as a rule, preceded by the premonitory symptoms already referred to. In view of the far greater liability of the myopic eye, symptoms of choroidal congestion have a much greater significance with regard to the danger of detachment of the retina than they have in the case of emmetropic and hypermetropic eyes.

*Both eyes* are affected in only a small proportion of cases; about 1 in 13 in Galezowski's table. But in spite of the rarity of the double accident, it is wise, where one eye has already suffered, to place the other under very rigid rules as regards the avoidance of all predisposing causes.

*Injury* is a frequent cause; Galezowski observed it in 61 cases. In the hypermetropic and emmetropic eye an extravasation of blood, caused by a blow or a contusion, leads but rarely to detachment of the retina; even a rupture of the choroid, although causing at first some displacement of the retina, does not, in these eyes, usually leave a permanent detachment. But in myopic eyes, especially if the myopia be of high degree, any blow or contusion, either upon the eye itself or upon the temple or margin of the orbit, is extremely dangerous in this respect; detachment is apt to follow, either immediately or not long afterwards. (We had not long ago, under our own care, a gentleman, aged 69, with M.  $\frac{1}{2}$  in each

eye and a large retinal detachment in the left, which occurred, according to the history given, as the immediate result of the slight shock caused by jumping off a hurdle over which he had climbed.)

*Pregnancy and Parturition.*—In seven cases the author met with it either during pregnancy or soon after delivery, the latter more frequently than the former. Pregnancy predisposes to congestions and venous stases, and any organ the resistance of which is already lowered is apt to suffer in consequence. The violent muscular efforts which attend labour may cause engorgement and rupture of vessels within the eye, and thus lead, under predisposing circumstances, to detachment of the retina.

*Albuminuria*, whether in connection with pregnancy or arising otherwise, appears, very occasionally, to lead indirectly to detachment of the retina, but such cases are rare; Galezowski noted 5 amongst his 649 cases.

*Diabetes, erysipelas of the face, neuralgia of the fifth nerve, and sympathetic disease* appeared in a small number of cases to be the cause of a retinal detachment. In a sympathetic case enucleation of the exciting eye produced a sensible improvement in the condition of the eye affected with detachment, but did not lead to a cure.

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**Detachment of the Retina.—Discussion by the French Ophthalmological Society, January 28th, 1884.—*Revue Clinique d'Oculistique*, February, 1884, p. 42.**

M. Galezowski presented the statistics recorded in the foregoing abstract. An analysis of the fluid withdrawn by means of a fine syringe from beneath a detached retina, gave the following results :—

Water	-	-	-	-	91	parts.
Chloride of Sodium	-	-	-	-	5'50	„
Albumen	-	-	-	-	1'60	„
Various Salts	-	-	-	-	1'90	„
					<hr/>	
					100'00	„

showing that this fluid differs from ordinary serous effusions in that it contains much less albumen and more salts.

He had found syphilitic changes to be the cause of a detachment in a few cases; rheumatism in a few others; in by

far the larger number it was connected with myopia or injury. Speaking of treatment, he urged that the patient should, in all cases, be kept in the horizontal position for several months.

M. Boucheron maintained, in opposition to M. Galezowski, that the retina may be detached by exudation from the choroid without antecedent change in the vitreous. He had injected a 1 per cent. solution of cantharidate of soda between the sclera and choroid of a rabbit; an exudation from the choroid was produced, which, passing through the choroidal epithelium, detached the retina, and even penetrated it so as to reach the vitreous. He had examined histologically a human eye affected with choroidal sarcoma in an early stage before the period of increased tension, and with a recent retinal detachment; the vitreous body was intact, and was adherent to the detached portion of the retina. The alterations commonly met with in the vitreous he considered to be secondary to the detachment of the retina. Displacement of the retina causes similar displacement of the vitreous, and this leads, secondarily, to contraction in the stroma of the vitreous. Like Galezowski, he considers the ruptures of the retina, lately dwelt upon by Leber, to be secondary to the detachment, and not the cause of it. He advises immediate iridectomy, with the idea of improving the condition of the uveal tract, and the relief of rheumatic and uremic conditions, which he believes to be frequently present, by pilo-carpine, and rigorous systemic regimen.

M. Pamard believed that, even when a replacement of the detached membrane was obtained, its function was very rarely restored, and that it was unjustifiable to impose a long sojourn in bed upon patients suffering from a malady so incurable. He now treated such cases only by hygienic measures, recommending exercise rather than rest, and hoping to improve the patient's general condition, but not to cure the detachment.

M. Abadie urged that modes of treatment which have been proved ineffectual should be renounced. He did not deny that the horizontal position sometimes produced improvement, but believed that all that was possible may be gained in a few days, and that even this improvement is never permanent.

M. Parinaud stated that, in two cases following specific choroiditis, constitutional treatment gave no improvement. He recommended a proceeding including an incision in the

sclera, with repeated punctures and sweating, but had treated only three cases thus, of which one, of only eight days' duration, of traumatic origin, had been cured, while the two others obtained no benefit.

M. Armaignac had obtained a temporary cure by means of aspiration of the sub-retinal fluid, followed by compression and rest, but the improvement had not lasted more than three months. He had seen a detachment disappear spontaneously without treatment in a myopic eye, but vision had not been improved by the replacement of the retina.

M. Chibret urged the abandonment of useless modes of treatment, but dwelt upon the necessity of hygienic measures for the safety of the second eye.

M. de Wecker, having tried all the surgical measures which had been suggested, had found them all useless and abandoned them. It was not desirable, however, to abandon all treatment, especially when a detachment appeared to be progressive; in such cases the compressive bandage, together with rest in the horizontal position for a reasonable time, was useful. He had recently obtained benefit by a strong "revulsive" treatment, consisting in the repeated application to the sclera of heated points (*pointes de feu*).

M. Landolt had seen a case of traumatic detachment completely cured. After the usual methods of treatment, including rest in the horizontal position, had failed, the patient went a voyage, and was found, on his return, to be cured.

M. Coursserant had arrested mischief by the measures alluded to by Wecker. Like other speakers, he had observed much more favourable results in traumatic cases than in others.

M. Dor had no faith in surgical treatment, but would not abandon all other measures. He had obtained a cure in two cases—the one traumatic, the other due to myopia. He maintained the recumbent position strictly for four weeks, applied the artificial leech once each week, and gave pilocarpine daily.

M. Martin had tried various therapeutic measures, and had been successful and unsuccessful with each. The successful cases were traumatic. In one case, which had been cured, the detachment recurred in consequence of a severe fright. Believing that the recurrence was due to a sudden contraction

of the ocular muscles, he had, he said, "decided, in future, in the case of patients who are cured, to avoid subsequent movements of the eye by dividing the four recti muscles." (M. Pamard: "And the obliques?") "And the obliques, if I can do so." (The proposition did not appear acceptable to the majority of those present.)

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Dransart, in the *Annales d'Oculistique*, May—June, 1883, advocates the re-adoption of iridectomy in certain cases of retinal detachment. In a patient with anterior synechia, loss of vision, severe pain, and a large detachment of the retina, a large iridectomy upwards caused cessation of pain and improvement of vision; the retina became re-attached throughout. In three cases of old detachment the results were relatively successful; in two cases of recent detachment vision was completely restored. After the operation the patients were kept in bed, and a compressive bandage, together with a very moderate administration of pilo-carpine, was employed.

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**D. S. LAMB and SWAN M. BURNETT.** Multiple Gunshot Wounds, with Consequential Reflex Phenomena on the part of the Eye, Heart, and Leg. *Amer. Journ. of Med. Sciences*, April, 1884, p. 450.

A soldier, aged 22, was shot, in 1862, receiving three flesh wounds from as many leaden slugs; one just above the inner side of the right knee; a second just above the flexure of the right elbow; and the third over the upper anterior part of the left side of the chest, near the shoulder, the slug entering just over the left third rib, nearly in a line perpendicular to the middle of the clavicle, and passing upwards and backwards, lodging in the deep muscles. He cut out with his pocket-knife the missile in his thigh; the other two remained imbedded. The wounds of the extremities were slight, and in twenty days had healed; that of the chest was deeper.

As soon as wounded, he fell forward unable to speak, though retaining consciousness; his mind was unusually active, and incidents long forgotten passed rapidly in review before him. At first the pain in his chest was sharp and tingling, accompanied by a beating throbbing sound in the left ear, and

great sensitiveness of the eyes to light. All of these symptoms gradually disappeared, and in two months he rejoined his regiment. Within a year, however, his eyesight had so far failed that he was compelled to use positive glasses when reading; even then, the left eye was nearly useless; he had, also, frequent attacks of neuralgia of the heart. These ocular and cardiac troubles remained unchanged for twenty years. Although the wound of the chest did not give him inconvenience, he could at any time, by simply striking the heel of the left foot smartly on the ground, produce a *numbness of the entire left side, including the arm and head*.

In 1865, he was again wounded; a carbine bullet entered the palm of the right hand, passed upwards, fracturing the carpal bones and opening the joint, and continued its course up the front of the forearm, emerging just below the elbow, on the anterior aspect; the forearm was amputated in the middle third by the circular method. The patient's general condition was good, and he made a rapid recovery; the stump, however, was painful from the first, the pain often extending up the arm and into the neck and head.

In 1882 his condition was as follows: Pain in the stump, radiating to the head, neuralgia of the heart, imperfect vision, requiring the use of glasses, and left eye nearly useless. The slugs remained in the chest and right arm. One day he fell down a steep flight of steps, striking his left shoulder in the fall; he was nauseated, and felt a sharp smarting pain in the left hand and arm and down the spine. These symptoms gradually wore off, and the next morning he complained of only slight soreness from the bruise. About noon, however, while writing (of course with the *left* hand), he suddenly lost the use of his fingers, and a moment afterwards of the left arm and leg; there was a complete paralysis of motion and sensation of the left side; he could not feel the deep prick of a pin; eyes very sensitive to light; voice weak and tremulous. In four days he had so far recovered as to be able to walk, but the arm and hand remained almost useless. In the hope of benefit, the slug, which remained in the left chest, was removed, after nearly twenty years' sojourn. It was as thick as a common lead pencil, three-fourths of an inch in length, flattened at both ends, and weighed 129 grains. The numbness and coldness of the



left side now gradually disappeared. In three weeks he could hold a pen and write a few moments at a time, and in six weeks the hand and arm, with the exception of slight weakness, were as well as ever. The sight of the right eye improved, but there was no change for the better in the left; the neuralgia of the heart ceased to trouble him.

In 1883, the sensitiveness of the stump continuing, the slug remaining in the right arm was removed, but without perceptible relief of pain. Then in view of the possibility of a nerve of the stump having been included in the cicatrix, excision was performed. The stump was opened, and about one-and-a-half inch of thickened and indurated tissue removed, including a portion of the radial nerve. After the wound had been closed by sutures an oozing took place into it, accompanied by excruciating pain and entire loss of vision; it was necessary to reopen the wound and turn out the clot; vision began to return thirty-six hours after the excision; the wound healed by granulation without further accident.

In January, 1884, there remained a little sensitiveness in the stump when pressed upon or chilled; an occasional slight numbness in the left arm and hand; and at long intervals a very slight neuralgia of the heart.

Dr. Burnett saw the patient in 1883. There was an obstinate papillary conjunctivitis of both eyes, and a recent difficulty in vision of the right; the left had been amblyopic since the injury. Right: V  $\frac{4}{4}$ , but cannot be used for any length of time continuously; contraction of the visual field, gradually progressing during some weeks till the boundary lay at about  $25^\circ$  all round the fixation point. Left: V  $\frac{2}{60}$ ; field, roughly tested, normal. Pupils equal, and active; fundus normal in both eyes. After the final operation described above, the right field expanded to the normal size; (left field not recorded); vision improved greatly in all respects and there was "no return of the eye symptoms."

Burnett is disposed to refer the amblyopia in the foregoing case to a reflex influence of unknown nature acting on the cerebral centre of vision. In the article on reflex amblyopia published in the present number of this journal a different explanation of such symptoms may be found.

*Figures for Recording Diseases of the Eye.*—We have received from Messrs. Lebon and Co., of Chancery Lane, a useful set of printed diagrams, intended for graphic records of eye affections. They are bound in a volume of fifty sheets, each sheet comprising a right and left fundus, a life-size outline of the two eyes, with nose and brows, and separate circles for the corneæ or pupils. They are gummed and perforated for ready insertion in the case book. They form part of a series of clinical diagrams of various parts of the body, published by the same firm.

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- SCHMIDT-RIMPLER. Ueber eine besondere Form der Ophthalmomalacie.  
*Ber. d. Heidelb. Ophth. Ges.*, 1883, p. 169.

## TEMPORAL HEMIANOPIA, WITH TWO CASES.

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Newton, of whom it has been said that "his conjectures have commonly more foundation in fact and more verisimilitude than the dogmatic theories of most other philosophers," was led to the following hypothesis to account for the fact of our seeing objects singly with two eyes: "Are not the species of objects seen with both eyes united where the optic nerves meet before they come into the brain, the fibres on the right side of both nerves uniting there, and after union going thence into the brain in the nerve which is on the right side of the head, and the fibres on the left side of both nerves uniting in the same place, and after union going into the brain in the nerve which is on the left side of the head; and these two nerves meeting in the brain in such a manner that their fibres make but one entire species or picture, half of which on the right side of the sensorium comes from the right side of both eyes through the right side of both optic nerves, to the place where the nerves meet, and from thence to the right side of the head into the brain, and the other half on the left side of the sensorium comes in like manner from the left side of both eyes? For the optic nerves of such animals as look the same way with both eyes (as men, dogs, sheep, oxen, &c.) meet before they come into the brain, but the optic nerves of such animals as do not look the same way with both eyes (as of fishes and of the Chamelion) do not meet, if I am rightly informed." This, which is included amongst the Queries appended to his Optics, must be looked upon in the light of modern knowledge as a marvellous approximation to

the truth. If we give to the expression "picture" a more figurative meaning than was probably imagined by Newton, it corresponds indeed exactly to what we now believe.

The experiments of Munk, and the results of post-mortem examination in the cases of Hosch, Curschmann, Haab Samelsohn, and a few others less absolutely conclusive, have definitely established the existence of a unilateral source of innervation for corresponding halves of both retinae. There may still be some difficulty in explaining such cases as absence of the chiasma as were reported by Vesalius Aquapendeus and Valverda, which led Dr. Reid, the ingenious author of an Inquiry into the Human Mind, and whose estimate of Newton's acuteness of conjecture I have already quoted, to say: "When we consider this conjecture of Sir Isaac Newton by itself, it appears more ingenious, and to have more verisimilitude, than anything that has been offered on the subject; and we admire the caution and modesty of the author, in proposing it only as a subject of inquiry; but when we compare it with the observations of anatomists which contradict it, we are naturally led to this reflection, that if we trust to the conjectures of men of the greatest genius in the operations of nature, we have only the chance of going wrong in an ingenious manner." Still, all the conditions of these anomalous cases can hardly be said to have been properly explained. We do not always know what imperfection existed in the vision of those who were the subjects of the unusual anatomical arrangement, nor can we in any case say that the semi-decussation usually taking place in the chiasma might not have existed somewhere else. It is curious that Reid's remarks, which are so applicable in general, should have turned out to be inapplicable to the very case which prompted them.

The arrangement of the optic nerve fibres renders the localisation of the lesion producing temporal hemianopia a very simple process. There is, of course, the remote possibility of a symmetrical lesion in the two halves of

the brain, but apart from this, and as by far the most probable cause of the symptoms, we must admit an interruption of function produced by some destruction or compression of the nervous elements of a portion of the chiasma. The defects produced in the function of the temporal halves of each retina will be the more complete and symmetrical the more the lesion is confined in its effect to an anteroposterior line through the chiasma. Thus, whereas the lesion producing the more common form of homonymous hemianopia may be anywhere along the course of the optic nerve fibres between the chiasma and the cortex of the occipital lobe, and can rarely be localised with any great certainty, although concomitant symptoms often afford a clue, temporal hemianopia is almost certainly due to a lesion mainly implicating the chiasma.

It is difficult to form any idea of the frequency of this form of hemianopia. Owing to the nature of the defect leaving a much larger field for both eyes than the homonymous form, the patient does not as a rule complain of blindness to one side. The other symptoms too, amblyopia, ophthalmoscopic changes, etc., are sufficiently marked to engage the whole attention of anyone who does not make a routine of the examination of the peripheral vision. Besides, it is not likely that all the cases observed are published. Mauthner believes that they constitute about one per cent. of all cases of hemianopia, while Förster's estimate is 23 per cent. The actual percentage probably lies between these extremes and much nearer the former than the latter. It is obviously a disease of too rare an occurrence to furnish even approximately correct statistics from the practice of any single observer, however extensive his experience. Graefe in his famous paper on the examination of the field of vision in amblyopic affections,\* which first directed attention to the importance of determining accurately the state of peripheral vision, says that whereas one not un-

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\* Archiv. f. Ophth. Vol. ii., 2. p. 258.

frequently meets with cases in which the vision is lost from the same side of each eye, it is not by any means a frequent occurrence (es nicht gar häufig vorkommt) to find the right half of the right and the left half of the left eye defective.

The literature of the subject has been very fully collected by Mauthner\* and Wilbrand.† The salient points in connection with 37 cases which had been recorded up to the date of the publication of their works are given by these authors.‡ Several of these cases cannot, however, be looked upon as undoubted examples of this disease (looked upon as a manifestation of central changes). Mauthner's work is probably in the hands of most readers of this Review, and Wilbrand's is easily procured; it will, therefore, only be necessary for me to notice the cases of temporal hemianopia which have been published since these works were written. They are, as far as I have been able to discover, but 3 in number, only one of which can be said to be typical. It is recorded by Gnauck§:—A man of 35 years of age, previously in good health, became gradually blind in both eyes, the blindness being complete in the left and nearly so in the right, and in both beginning with an increasing obscuration of the temporal halves of the fields of vision, which subsequently involved the nasal halves. After some weeks an improvement took place, the nasal halves being restored, in the case of the right eye, to a normal condition, in that of the left not completely (leaving a defect for colours), so that ultimately a true temporal hemianopia was the result, with the line of demarcation between the blind and seeing portions passing almost vertically through the point of fixation. Ophthalmoscopically there was found

\* Hirn und Auge.

† Ueber Hemianopsie, und ihr Verhältniss, zur topischen Diagnose des Gehirnkrankheiten.

‡ 13 Cases are given by both, 14 by Wilbrand alone, and 10 by Mauthner alone; W. also quotes 12 cases of autopsy in disease of chiasma.

§ Neurolog. Centralblatt, No. 9. 1883.

atrophy of the optic nerve. The patient remained in the same condition during the seven months he was under observation. The other two cases given by Nieden\* are cases in which a fracture of the base of the skull was followed by complete blindness of one eye, and obliteration of the temporal half of the field of the other. In one of these cases there was polyuria and no ophthalmoscopic changes, in the other atrophy of the nerve on the totally blind side ; but although, as in the first, there was excessive thirst, the existence of polyuria was not determined.† I am induced to publish the two cases which have come under my own observation, now, because in one the hemianopia which existed for two years in much the same condition has now so much altered that a post-mortem examination, even if the lesion should cause death, would not be of the same interest as formerly ; and in the other there has been so steady an improvement, and the patient is now so well, although still retaining the characteristic blindness, that I trust there may be no opportunity of confirming the diagnosis.

Case I.—John B——, cork cutter, aged 28, first seen March 28th, 1882, when he stated that his sight had been failing for some months. On ophthalmoscopic examination, the discs were found to be extremely pale.  $V = \frac{20}{100}$  L,  $\frac{20}{40}$  R. The acuity of vision did not materially change within the limits of illumination by which I retained full vision. The vision of the temporal half of the field of the left eye was abolished (retaining only slight perception of light), and in the right eye the temporal side of the field had also suffered a very considerable impairment of its function (loss of colour vision and very defective form sense). The portions of the fields retained in both eyes seemed to be normal in every respect, and there was a sharp line of demarcation between the healthy and defective portions. This boundary was nearly vertical, and apparently about  $3^{\circ}$ — $4^{\circ}$

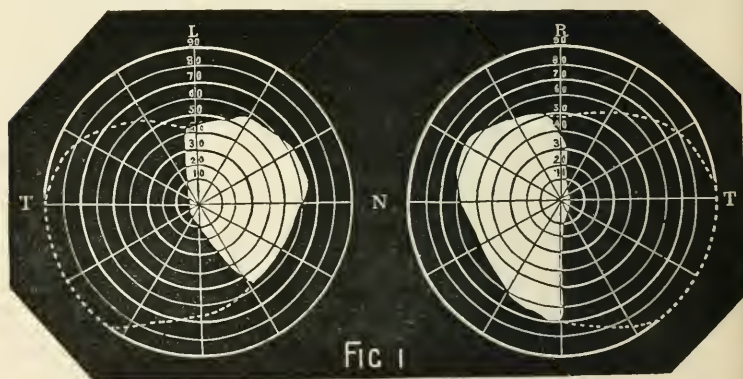
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\* Archiv. f. Augenh. xii. p. 30.

† I have not quoted any of the cases of hysterical origin, which according to Rosenthal are frequent ! Vid. Untersuchungen über Hysterie u. Transfert Arch. F. Psych., XII., 1.



to the temporal side of the middle line through the centre; the extent of the area of blindness being, however, greater in both eyes below than above. There was a doubtful syphilitic history beginning twelve years previously, which led me to diagnose a periostitis or gummatous swelling, exerting a pressure on the chiasma. The patient did not return for a year afterwards, at which time the condition appeared to be very much the same, with the exception that both temporal halves of the field were now blind. His own statements were to the effect that he had been much better for eight or nine months, and had then got worse again. A complete examination of the central and peripheral vision was not made then, as he promised to come to the hospital next day. This he failed to do, however, and next made his appearance on the 29th of November, 1883, when the condition of the fields of vision was as in Fig. 1, with



V >  $\frac{20}{200}$  R, >  $\frac{20}{70}$  L, only slightly worse, therefore, than eighteen months previously — ophthalmoscopically; marked atrophy of both nerves. After this a rapid deterioration took place, and when he was admitted, on February 8th,\* as an

\* The following is the state of vision as taken a few days after admission, kindly given me by Dr. Wyllie. Visual acuity so much impaired as to be represented by the fraction  $\frac{8}{20}$  (the patient makes out with difficulty at a distance of one metre the fig. 8 in Mayerhausen's numbers. He cannot read any of the types in Robert's little book). In a good light he counts fingers with difficulty. On testing each eye separately with a candle very typical temporal hemianopia is found upon each side. It is most extensive on the left side, the whole macula being then included in the blind half of the field of vision. In the right eye the line of demarcation evidently runs through the macula, or else by its margin, since the candle becomes dimly visible when held opposite the central axis of vision.

in-patient, under Dr. Wyllie, the central vision was extremely defective, although the hemianopic nature of the blindness remained still marked. I had recommended him to seek admission some time previously, but he declared that an irresistible *drowsiness*, which lasted for days, had prevented him from coming. He was discharged on March 23rd almost quite blind, but otherwise apparently in better health, and has since been an out-patient. Dr. Wyllie has kindly given me the following report of the present condition:—April 29th: Remains perfectly blind, except very faint perception of the window; says, however, that on some days he sees objects pretty distinctly, being able, on such occasions, for example, to recognise his mother.

This, then, is an instance of a case in which the typical temporal blindness was slowly developed, remained for a considerable time unaltered, and then proceeded to more complete blindness. The cases of del Monte,\* Mooren (2nd case)†, Hirschberg,‡ and others are more or less similar, and it seems probable that the prognosis is not so favourable as in such a case as the following, where there was a gradual but steady improvement from the first:—

Case II.—Mrs. McA——, 32, from Dundee, first presented herself at the Royal Infirmary on August 22, 1883, complaining of defective sight. On ophthalmoscopic examination both discs were found to be extremely pale; there was besides a very abnormal arrangement of the pigment cells in the choroidal interspaces, probably congenital, V almost nil L,  $\frac{20}{100}$  R, and blindness of right side of field. A chart was unfortunately not taken. She could give no cause for the blindness, but had been suffering for six months from headaches, constipation, giddiness, and flushing of the head. Menstruation ceased at the age of 23, and there were no children. I recommended

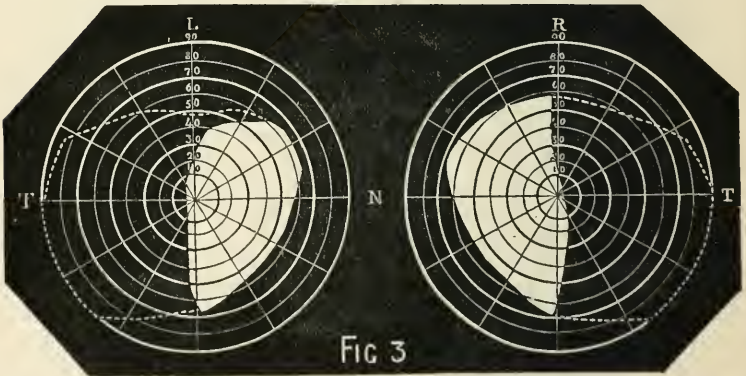
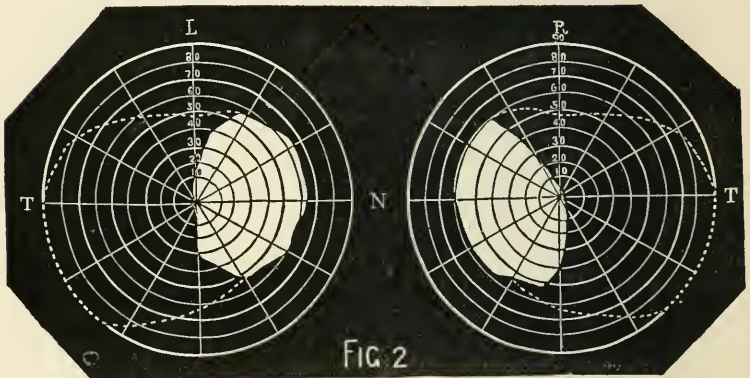
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\* Osservazioni e note cliniche, Naples, 1871.

† Ophthalmiatriische Beobachtungen, 1867.

‡ Beiträge zur practischen Augenheilkunde 3.

a course of saline waters and cold douches, which she adopted, and when she next returned, on October 18, there was very considerable improvement in vision; L = fingers at several feet, R =  $\frac{20}{70}$ . The state of peripheral vision at that date is shown by the chart, Fig. 2. The blindness of the left eye



at the previous visit had obscured the real nature of the case. Shortly after this she seems to have had some degree of polyuria, lasting for two months (there were frequent calls for micturition, and a larger quantity of urine passed each time than usual). On April 19th, 1884, the patient presented a

much more healthy aspect, the headaches and giddiness, etc., had disappeared, and the vision had risen to  $\frac{20}{200}$  L and  $\frac{20}{50}$  R, with field as in Fig. 3.

The lesion in this case is evidently not a spreading one, and must have produced the maximum destruction or pressure antero-posteriorly along the chiasma, probably a hæmorrhage or embolism (?). The cases of Laqueur,\* Graefe,† and Schön,‡ (2nd case), and others are analogous in the manner of their development and course, Graefe's ending in complete cure.

Polyuria is only mentioned as a complication in four cases, those of Graefe, del Monte, Brecht,§ and Nieden. In 153 cases of homonymous hemianopia collected by Wilbrand, it was met with but twice.

It seems possible that the cessation of menstruation may have been of some etiological importance in the case of Mrs. McA——. A similar circumstance occurred in two of Schön's cases, in one of which menstruation ceased at the age of 24, in the other at 36. In Uhthoff's|| case the catamenia did not return after a confinement in the 27th year, and in the case already cited of Graefe's, the hemianopia occurred after cessation during two periods. All these cases suffered much from headache and giddiness, and although the diagnosis arrived at by v. Graefe in his case was limited periostitis, the case could as well be explained on the assumption of some vascular change.

\* Klin. Monatsblätter, 1864, p. 276.

† Klin. Monats., 1865.

‡ Die Lehre vom Gesichtsfelde, &c., 1874.

§ Graefe-Sæmisch, V., 938.

|| Graefe's Archiv., XXVI., 1, p. 263.

A CASE OF GRAVES'S DISEASE IN WHICH  
THE PROPTOSIS EXISTED ON THE LEFT  
SIDE ALONE, HAVING ORIGINALLY  
AFFECTED BOTH EYES. OBSERVATION  
OF CARDIAC ACTION.

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The following case of Graves's Disease, in which the proptosis was confined to the left eye during the time of observation, has some points of special interest, particularly in the fact that the proptosis was originally present in both eyes, and subsequently declined in the right; a striking illustration of the variations which a single case of this malady will present in the course of its history. The goitre was of very small size. But I have thought the case deserving of notice in the "Ophthalmic Review" chiefly from its bearing on the argument in favour of the theory of "a Central Lesion in Graves's Disease" explained and enforced by Dr. Fitzgerald last year, in the "Dublin Quarterly Journal," and analysed in this Review (O. R., II., p. 148).

In the original paper Dr. Fitzgerald assigns strong reasons in favour of the opinion that it is the right vagus which is chiefly concerned in inhibiting the heart, the left nerve taking little part in the operation. After quoting in support of his suggestion some anatomical observations made in the horse, on the distribution of the two vagi in relation to the heart, and having cited the result of some experiments illustrative of their respective power of inhibition; and after having advanced an interesting explanation of this asserted special connection of the right vagus with the heart, derived from the history of embryo life, the author adds—"if there be anything in the suggestion, one should expect to find that a considerable proportion of those



very rare cases in which cardiac symptoms are absent, the other symptoms should preponderate on the left side, and investigation shows that it is so." He then gives a report of six cases of Graves's Disease, in which the left was solely or mainly the seat of the typical signs of the disease, and he claims these cases as agreeing with the results to be anticipated ; but on the other hand, with much impartiality, he adds three other cases in which cardiac symptoms were absent, and which he admits tell against his theory.

In my present patient, although cardiac symptoms were not entirely absent, whatever explanation be accepted, the character of the pulse, in the most important quality (so far as this argument is concerned), that of frequency, stands in direct contrast with that belonging to the immense majority of cases of Graves's disease. Sattler states that the pulse, in typical cases, never falls below 90 or 100 (Fitzgerald, *Op. Cit.*, p. 207); in my patient, in every examination made by myself, the number of the pulse was only once above 90, and on that occasion it fell to 80 in ten minutes. Palpitation had been complained of, though not whilst the patient was in the Hospital, but the first complaint of this symptom preceded by six months the earliest sign of Graves's Disease, and it is not improbable that both the palpitation and the irregularity of rhythm observed by ourselves on certain occasions may be referred to the abnormal condition of the heart itself, revealed by physical examination. It must also be remarked that the right side was not perfectly spared, as shown by the persistence of Stellwag's sign.

The persistence in the right eye, after the disappearance of the proptosis, of the open eye from retraction of the upper lid, noticed especially by Stellwag as largely contributing to produce the physiognomy so peculiar in Graves's Disease, is worthy of notice ; this, however, is by no means a solitary example of the independence, at least under certain conditions, of prop-



tosus and "Stellwag's sign." This persistence prevented the eye from regaining its natural character.

I would also refer to the repeated occurrence of chorea in the patient within the last six years, as affording an illustration of one of the various forms of nervous abnormality so constantly found in connection with this remarkable malady. It would probably be refining too much to connect the greater severity of the choreic movements on the left side with the persistence of the proptosis on that side, especially in face of the well-known absence of symmetry in the affection of the two sides of the body in most cases of chorea. Another form of nervous abnormality presented itself to me in a patient lately under my care in the Hospital, with typical Graves's Disease, in the shape of a remarkable temperature, frequently rising to  $103^{\circ}$ , certainly derived from hysterical deception, and persisted in for several weeks; the girl subsequently developed hysterical aphonia. The case which I have now to describe is as follows:—

The patient is an ill-developed, ill-nourished girl, aged sixteen, five feet two-and-a-half inches high, but weighing only seventy-four pounds. She has never menstruated; she presents well marked exophthalmos on the left side only; the cornea is entirely uncovered by the lids, and when the eye is "shut" the lids do not come nearly in contact; the prominence is one of high degree. In the right eye, as in the left, the upper lids are quite retracted, and the peculiarity thus given to the eye imparts to it the unnatural stare of Stellwag's sign. Graefe's sign is imperfectly developed in both eyes if at all. In the neck there is a very small goitre alike on the two sides.

The account given by the mother is, that the neck began to enlarge eighteen months ago, some time before any change took place in the eyes; the proptosis has only been noticed for thirteen months. At first, the mother states, both eyes were equally prominent, and the lids did not completely close during sleep; subsequently the right eye "went down," though it has never regained its natural appearance. The goitre has never varied. The girl has suffered from palpitation during the last two years,

especially when excited, but made no complaint of it whilst under our observation. She has had five attacks of chorea during the last six years; in each instance the left side was more affected than the right. She has also been subject to faints. She has never had rheumatism. She feels a sensation of heat frequently and suffers from hot weather; she perspires readily, but never has had any looseness of the bowels. She has lost much flesh during the last twelve months.

The impulse of the heart is very diffused; the cardiac dullness is extended; decided pulsation is felt in the pulmonary area; she presents a soft presystolic mitral bruit, and a rough bruit commencing with the first sound, in the pulmonary area. There is some throbbing of the carotids but no bruit. The patient was admitted on February 26th, the last observation was made on April 12th. During that time I have recorded twenty-five observations of the pulse, seventeen taken by myself. At admission the number of the pulse was observed to be 108; on a later day I once found it 100, but in ten minutes it had fallen to 80. Twice I find 102 recorded as the frequency, and once 120. On the other occasions the number of the pulse varied between 90 and 98 five times (once only reaching 98); between 80 and 84 nine times; and was below 80 six times. The tension was very low (pressure not ascertained). The rhythm was regular in about two-thirds of the observations; occasionally intermitting in the remainder.

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Delay occurred in the publication of the foregoing report, fortunately allowing me to make the following addition. I have left my former description as it stood originally; but I have to state that since it was written an important change has occurred in the patient's pulse. The added note includes eleven observations of the pulse made by myself, between April 15th and May 14th. In the first observation the pulse varied between 104 and 112, but five minutes afterwards fell to 82; in the second it numbered 76; in the third (April 17th) it had reached 100. It then rose to 116, and only once fell afterwards below 110 (to 102), excepting in the final observation (May 14th), when it was 96. The rhythm throughout was regular. Now a decided change had also taken place in the condition of

the patient's right eye, more or less proptosis had returned, varying in degree from day to day, and though on some days considerable, never reaching the advanced condition of the opposite organ. One thing, however, I am bound to say: that I cannot accurately connect by date the change in the eye with that in the pulse. A tendency to return of proptosis certainly preceded the alteration in the pulse, but, as will readily be understood in a change of this character, the period of its commencement could not be accurately recorded.

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**GEORGES MARTIN (Bordeaux).** The relation of a form of so-called Strumous Keratitis to Corneal Astigmatism. Contribution to the study of Astigmatic Keratitis. *Annales d'Oculist.* July-Aug., 1883, p. 14, and Nov.-Dec., 1883, p. 176.

The author of these papers believes that corneal astigmatism is a frequent and important factor in the causation of keratitis, especially of that kind so frequently met with in young people, which usually affects both eyes, and is characterised by the formation of numerous pustules, by superficial infiltration and ulceration, vascularity and slowness of cure, and by liability to recurrence.

His theory is that the unequal contraction of the ciliary muscle by which, according to Giraud-Teulon, Woinow, Javal, and others, the astigmatic eye diminishes or neutralises its optical defects (*vide* O. R., Vol. 2, p. 53, 205), causes a disturbance of circulation in the ciliary region through which the cornea, by reason of its being a non-vascular structure, is especially liable to suffer. In support of his theory he points out that atropine, which suppresses all accommodative effort, is the most effectual means of treating the keratitis, and that correction of the astigmatism by means of cylindrical glasses has a marked influence in preventing recurrences. He holds that struma and other constitutional defects are auxiliary causes of the disease in many cases, but that in a large majority astigmatism is the most important factor.

In forty-two cases of keratitis past or present of the kind above described, examined with the ophthalmometer of Javal

and Schiötz, an astigmatism of from 1.5 to 5D. was found in every instance. In the large majority of the eyes the corneal curve was sharper in the vertical than in the horizontal meridian, as it usually is; in every case both eyes were astigmatic; where any difference in degree existed between the two eyes, the more astigmatic cornea was invariably the one which suffered chiefly or solely from inflammation,

In a later note the author, to some extent, invalidates the foregoing statistics by stating that, wishing to make use of typical cases only, he rejected from among the patients examined, those in which an astigmatism of less than 1.5D was found. He also eliminated, and with better reason, all cases in which the corneal disease, though associated with astigmatism, appeared to have been secondary to conjunctival mischief, but here the criticism at once suggests itself that if the presence of astigmatism was an accidental coincidence in these latter cases, it may have been so in the cases of primary keratitis also.

Granting that astigmatism of more or less regular form is very frequent in cases of corneal opacity resulting from keratitis, the main question is, as Martin allows, whether the faulty curvature is the cause or the consequence of the inflammation. In support of the former supposition he adduces the following arguments:—

In one case the astigmatism was noted before the keratitis occurred.

In five cases of keratitis and astigmatism, younger brothers of the patients presented astigmatism pure and simple; and in two instances the parents were found to have astigmatism, with traces of past recurrent keratitis.

In two instances the pre-existence of astigmatism was definitely established by the statements of the patients.

Where astigmatism is present in both eyes but keratitis in one only, it is more reasonable to suppose that it was congenital in both than to suppose it congenital in one, secondary to keratitis in the other.

If the astigmatism were due to spasmodic action of the lids during the inflammatory attacks it should presumably lie always in the same direction, which was not found to be the case. (The exceptions appear, however, to have been rare.)

It is difficult to believe that such high degrees of astigmatism as were noted, and which in four cases were found in eyes which had suffered only one inflammatory attack, could be produced by blepharospasm; and if blepharospasm were the cause, the astigmatism should increase with each attack, whereas in three cases it was proved that a fresh attack did not alter the astigmatism.

The cicatrising process after corneal inflammation would produce irregularities of curvature in a single meridian, and might render irregular a pre-existing regular astigmatism; it could hardly cause a regular astigmatism such as was found in more than two-thirds of the cases.

As a further argument in support of his theory, Martin reminds us that other observers have asserted that astigmatism may under some circumstances act as a cause of blepharitis, conjunctivitis, and disorders of the tear passages.

No one, probably, will say that a connection between astigmatism and keratitis is impossible, but it cannot, we think, be regarded as proved by the evidence here adduced. The way in which the cases were selected deprives them of a positive statistical value. Corneal astigmatism is discoverable by the ophthalmometer in a very large number of apparently healthy eyes. The age at which superficial inflammation of the cornea is commonest is just that at which, judging by asthenopic symptoms, astigmatism of low degree is least troublesome. And more significant still, it is proved that corneal inflammation is able to cause an astigmatism which is correctible by glasses. Commenting on Martin's paper, De Wecker and Masselon cite cases (*Annales d'Oculist*, Nov.-Dec., 1883, p. 174) in which corneal lesions arising from purulent conjunctivitis left considerable degrees of astigmatism correctible by cylinders.

A definite distinction between cause and effect in this matter remains then to be drawn. If it could be shown by extended ophthalmometric examinations of school children, such as those of Nordenson (*O. R.*, Vol. 2., p. 203), that a pre-existing and uncorrected astigmatism foreruns a special liability to keratitis, Martin's point would be proved. As it stands, his paper is a useful reminder of the very frequent value of cylinders in cases of slight corneal opacities.



J. M. PROUFF (Limoges). Sclerotoscopy. Observations relating to so-called Astigmatic Keratitis. *Revue Clinique d'Oculistique*, Feb., 1884, p. 25.

The author uses the word *sclerotoscopy* to express an inspection of the sclera, made with the object of estimating the general form of the globe. If a word is needed, *scleroscopy* would, we think, be more acceptable. The inspection is made as follows:—While the patient looks downwards, the upper lid is raised so as to expose the upper part of the sclera as far as possible; while he looks upwards the lower part is exposed in the same way; then the lids are simultaneously drawn apart as widely as possible, and the patient is caused to direct the eye strongly outwards and strongly inwards. A careful observation of the globe in these positions affords, according to the author's experience, definite and useful information as to its contour. Thus, he says, if the equator of the globe appears to be closely approximate to the circular form, it will invariably be found on trial that the cornea is spherical, or very nearly spherical, in shape—that it presents no congenital astigmatism. If, on the other hand, the globe appears to be flattened so that an equatorial section would present an ellipse instead of a circle, then the cornea will be found to have an ellipsoidal form corresponding therewith—an astigmatism the principal meridians of which are parallel with the axes of the equatorial ellipse. Examination of the cornea with Placido's disc will give in the former case a circular reflected image, in the latter case an elliptical image, the long and short axes of which correspond with the long and short axes of the globe in the equatorial plane. The greater the visible flattening of the globe, the higher will be the degree of corneal astigmatism. In any given meridian of the globe the disturbance of the corneal curvature is of an opposite kind to that of the scleral curvature. Corneal astigmatism is, then, the natural consequence of a "scleral astigmatism," and is hardly ever present without a corresponding error in the form of the rest of the globe.

With a little practice an astigmatism of 1 or 1.5D. may, the author says, be very generally diagnosed in this way, while higher degrees are usually associated with an asymmetry of the globe which is obvious to anyone.



Referring to Martin's assertion that astigmatism is a cause of keratitis (*vide p.* 178), Prouff suggests that scleroscopy will serve to determine whether the astigmatism which is met with in eyes damaged by corneal inflammation is actually of the pre-existent congenital kind, or whether it is a result of the corneal inflammation. In the former case it should be accompanied by a general asymmetry of the globe, in the latter not. His own conclusion is that the so-called astigmatic keratitis has no real existence.

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**A. G. H. GENDEREN-STORT (Utrecht).** Observations on the Movement of the Retinal Cones under the influence of Light and Darkness. *Communicated by Professor Engelmann at the Session of the Dutch Academy at Amsterdam, March 29th, 1884.*

Dr. Stort first observed this hitherto undescribed phenomenon at the Physiological Laboratory at Utrecht in November, 1883. His facts are briefly as follows:—

Under the influence of light the inner segments of the cones (the part nearest to the vitreous) become shorter; in the absence of light they become longer. Thus in frogs that have been kept in the daylight the inner segments of the cones are found broad and sessile upon the *membrana limitans externa*; after the frog has been kept in the dark, the cones are found more or less approximated to the pigment epithelium. The change reaches its maximum after one or two days' stay in darkness, when the inner segment of each cone is found lengthened out into a thin thread (0.05 mm. in length), which is continuous at its inner end by an expanded base, with a granule of the outer granule layer, and at its outer (choroidal) end is attached to the unaltered outer segment of the cone. The elongation is such that the outer segment reaches almost as far as the body of the pigment cells. In birds (pigeons) the inner segment lengthens equally in its whole extent, no expansion being left at its junction with the granule.

In pigeons the elongation sometimes amounts to several 100ths of mm., and all the varieties of the cones in all parts of the retina of the pigeons examined showed the change.

The previously known movements of the pigmented epithelium under the influence of light and darkness, although in other respects analogous to that of the cones now described, is not in direct causal connection with the latter.

The following table shows the actual elongation observed in the cones of pigeons, the measurements being taken from the centre of the red globules to the membrana limitans externa:—

PIGEON'S RETINAL CONES.

Part of Retina Examined.	Distance from Centre of Red Globule to Memb. Lim. Externa.					
	IN DAYLIGHT.			IN DARKNESS.		
	Average Measurements.	No. of Examinations.	Average Difference.	Average Measurements.	No. of Examinations.	Average Difference.
Red part ...	16	38	About 0'46	21'3	54	About 0'54
Fovea centralis ...	13'8	5	0'64	19'4	16	0'59
In front of pecten	14'6	20	0'59	20'7	46	0'54
Behind the pecten	14'3	3	0'43	20'9	22	0'63*

E. N.

## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MAY 8TH, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

*Choroiditis*.—Mr. Nettleship showed an ophthalmoscopic drawing of central choroiditis (Tay's disease) in a woman prematurely presbyopic, with extensive symmetrical guttate choroiditis, without any diminution in vision. Also a drawing

\* These numbers probably represent hundredths of a millimeter.—EDS.

of a peculiar appearance seen after neuritis. A number of straight parallel dark lines were to be seen, probably due to folding of the choroid, and, perhaps, produced by œdema of the choroid occurring at the same time as the neuritis.

Dr. Stephen Mackenzie had recently seen two cases of papillitis from cerebral tumour, in which a white streak running from the yellow spot subsequently appeared.

*Ossification of Choroid.*—Mr. Adams Frost showed a specimen of ossification of the choroid after an injury inflicted thirty years earlier. The eye had been the subject of several attacks of sympathetic irritation.

*Nævus of the Choroid.*—Mr. Jennings Milles showed a case of nævus of the choroid. The patient, a boy, aged 15, presented a congenital subcutaneous nævus on the right of the face, which varied in size. When he was six years old, his mother noticed that he was blind. When recently brought to the hospital the retina was completely detached, and close against the lens; the eye was excised owing to symptoms of irritation; the nævus occupied the outer and posterior portions of the globe, and consisted of a simple angioma, in parts cavernous. There was no nævoid condition of the orbit or conjunctiva.

Dr. Stephen Mackenzie referred to a case which Dr. Allen Sturge had shown, some years ago, at the Clinical Society; the patient had a large portwine-mark on the face, tortuous retinal vessels, and suffered from epileptic attacks. Dr. Sturge suggested that the epilepsy was dependent on a similar nævoid condition of the cerebral vessels; it was in this connection that these intra-ocular nævoid conditions were of interest.

Dr. Brailey thought it of interest that the detachment of the retina was accompanied by the formation of a new layer on the surface of the choroid; a fibroid layer in that situation always preceded the formation of a bony plaque. As nævus of the skin did not lead to other changes it was interesting to note that a firm, hard layer of almost bony consistence had been formed.

Mr. Nettleship said that, in Dr. Sturge's case, the condition differed markedly from this case, as the eye on the affected side was quite different from the other; it was myopic, and the choroid was darker.

*Acute Spasm of Accommodation.*—Dr. C. E. Fitzgerald reported two cases of sudden accession of apparent myopia, which relaxed on instillation of atropine, but in the first case returned on the discontinuance of the drug. Spasm of the accommodation, to a greater or less extent, was, he considered, always present in young persons who were hypermetropic or myopic; but this acute spasm was, in his opinion, very rare. Donders stated that he had never seen a clear case of it; but he quoted three cases, two of them recorded by Von Graefe, and one by Liebreich. In 1879 a case had been published in the “Italian Archives of Ophthalmology” by Professor Ravi. These were the only ones Dr. Fitzgerald was acquainted with, and the only work he knew which dealt fully with the matter was Professor Nagel’s monograph on “Anomalies of Refraction and Accommodation,” published in 1866.

Mr. Adams Frost asked whether, in the first case, the occupation was likely to have induced the myopia; and also the age of the patient.

Dr. Fitzgerald replied that the patient was a bank clerk, aged 23.

*Nervous Disease with Ocular Symptoms, and Alleged Monocular Diplopia.*—Dr. James Anderson related the case for Mr. Marcus Gunn and himself. The patient, a painter, aged 34, came to Moorfields on October 20, 1883, complaining of seeing several images of an object, especially when he looked to his left. He had convergent strabismus from partial paralysis of the left external rectus, with the usual homonymous diplopia arising therefrom; but, in addition, he asserted that with the right eye shut he still saw things double to the left of him. Except the paralysis of the left external rectus there was no abnormality in the muscular or refractive apparatus of either eye. The two images seen with the left eye were quite distinct, the right clear, the left dim, as were the images in the binocular diplopia, but nearer together than these. By the use of a prism it was sought to separate the images given by the two eyes, and so to ascertain if he saw three images with the two eyes, but he never did so. The patient, a fairly intelligent man, answered with the manner of perfect *bona fides*, and, so far as could be discovered, had no interest whatever in deceiving.

In addition to the above ocular symptoms, there was also atrophy of the left quadriceps extensor cruris, with loss of the left knee-jerk, the right being prompt and vigorous, also slight atrophy of the right scapular muscles and right thenar eminence, symptoms present in 1882, when he was under treatment in the London Hospital. There was also great loss of sensation, both common and special, in all areas supplied by the left trigeminus, and atrophy of the muscles supplied by its motor branch. There was no atrophy of the interosseous muscles of either hand, and none of the usual symptoms of lead-poisoning. The multiformity of the lesions, the affection of the trigeminus, and an obscure history of venereal disease, justified a diagnosis of syphilitic nervous disease, and under iodide of potassium the abducens paralysis gradually disappeared, and also the diplopia, both binocular and uniocular. The patient had recently, since giving up treatment, had several "fits" of doubtful character, in which he lost consciousness. Three cases of uniocular diplopia were already recorded in the Society's "Transactions" for 1882 (pp. 201, *et seq*). The cases were too few for generalisation. Points of importance were the occurrence of abducens paralysis with dilated pupil as a concomitant of uniocular diplopia, the two disappearing together in two of the four cases; and the presence of coarse cerebral disease in the two cases where there has been a *post-mortem* examination, with the occurrence in the other two of symptoms consistent with, although not decisive of, coarse cerebral disease.

Dr. Brailey had met recently with a case of paralysis of one external rectus and alleged monocular diplopia; the patient also presented symptoms of locomotor ataxy. He had felt sceptical as to existence of the diplopia, but he proposed to make further investigation. He mentioned that Mr. Snell was preparing a paper on this subject for the Society.

Mr. Nettleship referred to the case of a young man whom he had seen recently; he was probably suffering from coarse cerebral disease; he complained of diplopia, which appeared to be due to paralysis of the right external rectus, but there was said to be double vision with the right eye alone in the extreme right of the right field of vision. He had observed that the pupil was very commonly somewhat dilated in paralyses of the sixth nerve.

Dr. C. E. Fitzgerald had seen this condition without paralysis of any ocular muscles. In one case, that of a young lady with marked hypermetropia and asthenopia, marked monocular diplopia came on after reading. Another patient was a young boy, also the subject of hypermetropia; he was always consistent as to the presence of two images. In these cases, as the asthenopia disappeared, so did the diplopia.

Mr. Juler said that he had seen, some time ago, a woman, aged 40, who had slight paralysis of the left external rectus; she had homonymous diplopia, but also diplopia with the left eye alone.

*On Tortuosity of Retinal Veins in Association with Hypermetropia.*—Dr. Stephen Mackenzie showed a drawing and read the notes of a case of great tortuosity of the retinal veins in the left eye of a patient of Mr. Streatfeild's, who had hypermetropic astigmatism. The condition was practically confined to the one eye, which was the most hypermetropic. In the case he had exhibited last December, there was hypermetropic astigmatism, which was greatest on the side where the retinal vessels were most tortuous. He had a case now under care of a girl suffering from anæmia, whose retinal veins were tortuous, and there was slight hypermetropia. In most of the cases recorded, great tortuosity had been associated with hypermetropia, and in some the tortuosity had been greatest in the most hypermetropic eye; yet in others the tortuosity had been equal in the two eyes when the hypermetropia had predominated in one; and similar tortuosity had been present in one patient who was emmetropic. He also alluded to the association of headache with the tortuous retinal vessels in some cases. He thought further facts bearing on the question were needed.

Dr. Brailey mentioned a case of extreme tortuosity of the retinal veins associated with hypermetropia. Division of both internal recti had been performed, and the case was thus complicated. In answer to Dr. Stephen Mackenzie, he said that orbital cellulitis might have come on after the operation, and have produced tortuosity. He did not think that mere section of the internal recti could produce the result.

*Extraction of Cataract.*—Mr. Higgins read a paper summarising the results of his practice, accompanied by a table, in



which were recorded the sex and age of the patient ; the eye operated on ; the form of cataract ; the operation performed ; the result ; and remarks, when necessary. The number of operations was two hundred, performed on one hundred and seventy-five patients ; ninety-three males and eighty-two females. One hundred and eighty-one of the cataracts were nuclear ; nineteen were cortical. The results were :—175 (87.5 per cent.) successful ; 9 (4.5 per cent.) partially successful ; and 16 (8 per cent.) failures. Extraction by a small flap-section, the incision being situated in the sclero-corneal junction, associated with iridectomy, was advocated. Anæsthetics were almost always employed, twelve operations only having been performed without. He referred to a paper in the sixth volume of the Royal Medical and Chirurgical Society's Transactions, giving details of one hundred and fifty operations.

*Hæmorrhage in Yellow Spot Region.*—Mr. A. Stanford Morton read notes of a case of hæmorrhage in the region of the right macula, occurring in a patient aged 35, under Mr. Tay's care. The hæmorrhage was semicircular, but there were disturbances over a perfectly circular area extending from the optic disc to beyond the macula lutea. The patient's vision when first tested was only J. 20, but on March 31st was J. 1 and  $\frac{2}{10}$ . There was no history of blow or any illness except that the patient was liable to attacks of rheumatic gout (probably true gout). The urine and heart were normal. The patient stated that for the last two years he had been subject to bleeding from the right nostril once or twice a week, but that this had ceased from the time his sight became defective until two days previous to his vision being found normal, a period of about three months.

The President observed that it seemed clear that the patient had suffered from true gout, and hæmorrhages were not infrequent complications of that disease.

Mr. Nettleship thought that the hæmorrhages were probably due to disease of some of the larger retinal vessels. He had heard no explanation of the circular distribution of the hæmorrhage, and suggested that the anatomical structure might account for it.

Mr. Adams Frost observed that the circular shape might have become subsequently altered by absorption.

The President said that in cases of retinitis hæmorrhagica in gout, the hæmorrhages were usually not circular.

*Card Specimens.*—Mr. Adams Frost: Detachment of the retina, with organised blood-clot. Detachment of retina and choroid by blood. Detachment of retina; globe filled with organised blood-clot.

Mr. Jennings Milles: Microscopical specimens from (1) ciliary staphyloma and irido-cyclitis, (2) fibrous growth in the vitreous in a case of chronic glaucoma.

Mr. Lang: New vessels on a fibrous growth in the vitreous in a chronic glaucomatous eye. Mr. Morton showed a drawing of this case, and Mr. Milles a microscopic specimen of a similar condition.

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## THE DETERMINATION OF THE DEGREE OF LATENT AND MANIFEST SQUINT IN METRE ANGLES.—A SUGGESTION.

BY GEORGE A. BERRY, M.B.,

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As far as the requirements of operation are concerned, the ordinary linear method of estimating the degree of strabismus in any case with a strabometer is all that is necessary ; if indeed any measurement be taken at all. The method employed by Landolt and others in obtaining the angular deviation, by means of the perimeter, is certainly more accurate and scientific, though at the same time more tedious. But in ordinary cases of strabismus without diplopia, and especially with amblyopia of one eye, few probably take the trouble to determine the angle of squint. For many reasons, practical as well as scientific, it is more important to be able to estimate the degree of a latent deviation. Although this can be done with the strabometer, the measurements taken in that way, besides being far from accurate, are to a scale which does not readily show any connection between the state of convergence of the optic axes and the amount of accommodation exerted. The *angular* deviation of a latent squint, again, cannot be easily determined by the perimeter plan, but may, with greater or less accuracy, be arrived at by means of the examination with the double prism constructed on much the same principles as Stoke's lens. Or it may be determined by such a method as that recently described by Ferri,\* in which the image of the deviating eye

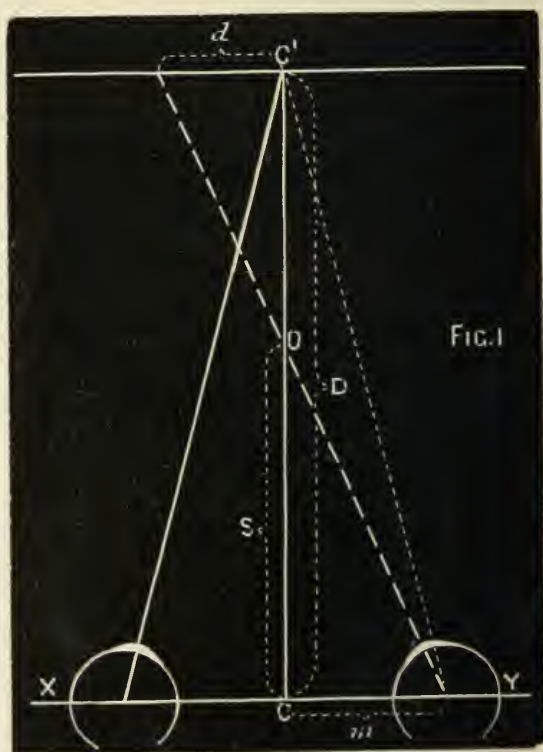
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\* Annali di Ottalmologia, xiii., 2.



(whose faulty position laterally is rendered manifest simultaneously with a prismatic dissociation of the images vertically) is projected on to a properly graduated tangent plane.

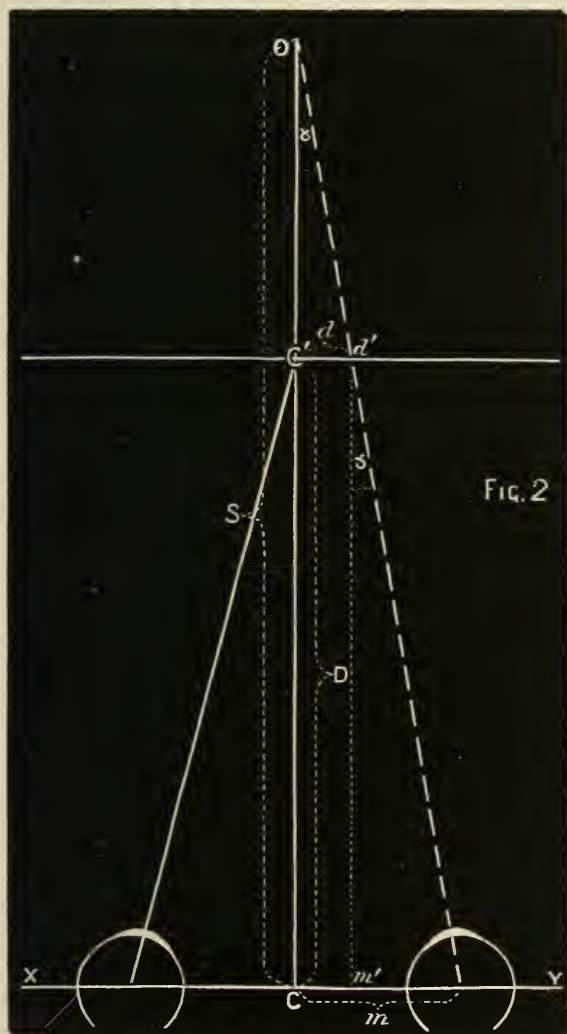
I have for some time past thought that the metre angle notation, introduced by Nagel\* for the measurement of convergence, and which connects in such a beautiful and simple way the degree of convergence with that of accommodation for any required distance, might be profitably applied to the abnormal cases of



deviation of one eye, either manifest or latent. Till recently, however, it did not occur to me how the measurement could be practically effected with sufficient accuracy.

\* Mittheilungen aus Tübingen, 1880.

From a consideration of the accompanying figures it will be seen that the problem is an exceedingly simple one. Take a base line  $XY$ , passing through the centres



this line. Make  $CC' =$  some fraction, say  $\frac{1}{2}$ ,  $\frac{1}{3}$ , or  $\frac{1}{4}$  of a metre, and through  $C'$  erect a plane perpendicular to  $CC'$  and parallel to the vertical plane through the centres of rotation of the eyes.

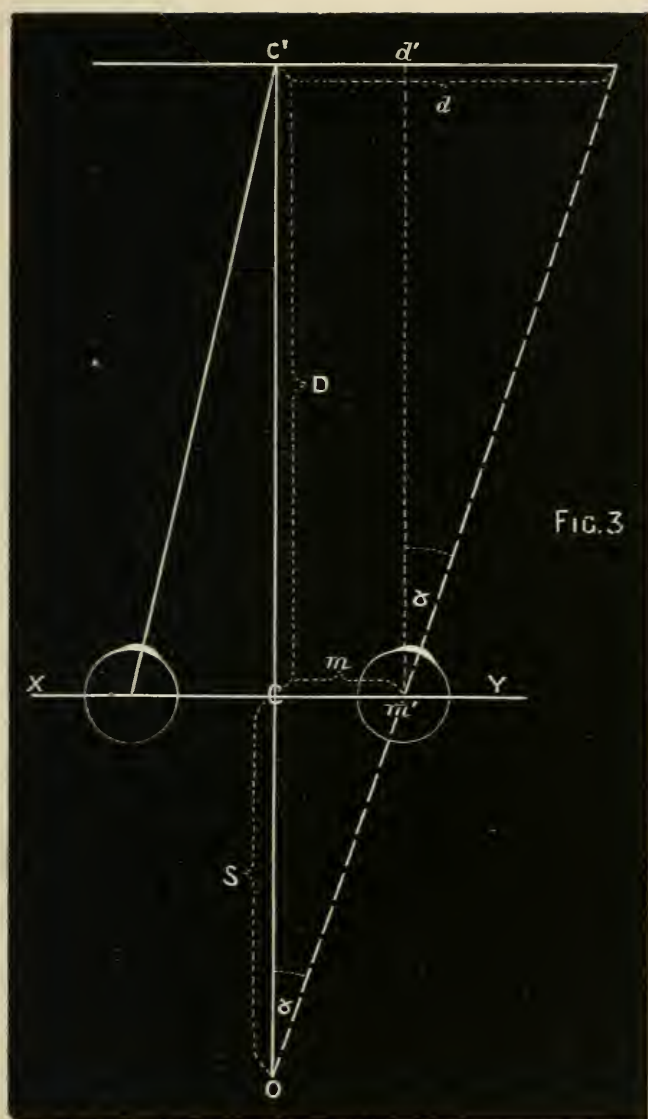
If  $XY$  be the centres of rotation of the eyes, and both eyes be directed simultaneously on  $C'$ , the angles  $XC'C$  and  $YC'C$  are said to equal 2, 3, or 4 metre angles according as  $CC'$  equals  $\frac{1}{2}$ ,  $\frac{1}{3}$ , or  $\frac{1}{4}$  of a metre in length; that is, according as 2, 3, or 4 dioptries of accommodation are necessary under normal conditions of refraction to fix accurately an object at  $C'$ .

But if one eye, instead of being directed to  $C'$  when the other is fixing an object there, be so directed that the visual axis cuts the line  $CC'$  produced if necessary (see Figs. I., II., III.), then the number of metre angles formed between its axis and the middle line is either greater or less than the properly directed one. The difference between the two angles  $YOC$  and  $YC'C$  evidently represents the deviation. This difference, it will now be shown, can be calculated in a very simple way, and only requires one measurement, which can readily be made.

Let  $m =$  half the distance between the two centres of rotation (generally about 30 mm.),  $d$  (the distance to be measured) = the lateral distance from  $C'$  to the point where the visual axis of the deviating eye meets the plane, and  $D =$  the length  $CC'$ . We have first to determine  $CO$ , which we may call  $S$ , the distance from  $C$  to the point where the deviating visual axis cuts  $CC'$  (produced if necessary).

If all the distances required be taken in mm. the reciprocal of  $S$  multiplied by 1,000 gives the metre angles formed by the faultily directed eye, and subtracting from this the reciprocal of  $D$  multiplied by 1,000, which gives the number of metre angles of convergence which correspond to correct fixation, we get the deviation in metre angles.

In Figs. I. and II., representing respectively an



abnormal increase and diminution in the required degree of convergence, we have

$$\frac{S}{m} = \frac{D}{m+d} \therefore S = \frac{Dm}{m+d}$$

In Fig. III., which represents a higher degree of divergence so that  $S$  is negative, we have

$$-\frac{S}{m} = \frac{Dm}{m-d} \therefore S = \frac{Dm}{m-d}$$

But the number of metre angles of deviation is given by 1,000  $\left(\frac{1}{S} - \frac{1}{D}\right)$  i.e., putting in the above value for  $S$ , by

$$\begin{aligned} 1000 \left( \frac{m+d}{Dm} - \frac{1}{D} \right) \\ = \frac{+d}{Dm} \cdot 10^3 \end{aligned}$$

As it is merely a question of measurement from the point of fixation of the fixing eye to either side, the sign may be neglected.

*The number of metre angles of deviation varies, therefore, directly as the distance from the point of fixation of the fixing eye to the point where the visual axis of the other eye meets the plane, and indirectly as the product of half the distance between the eyes and the perpendicular distance between the parallel planes through the centres of rotation and of fixation.*

In cases of manifest convergence or divergence the line  $D$  may be measured in the same way as along the arc of a perimeter in the ordinary method for obtaining the angular deviation. But in testing for latent deviation, the lateral displacement of the double image (added to the vertical one produced by a prism held in the ordinary way with the edge up or down) takes place to the opposite side of the middle line  $CC'$  from that on which the visual axis meets the plane. The distance of the horizontal line  $D$  measured from a vertical line through  $C'$  to the point of position of the image indicated by the patient, *though not exactly*, would be for practical purposes\* the same as

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\* Because although equal lengths  $d$  measured to either side give equal degrees of divergence or convergence measured in metre angles and are therefore probably physiologically equivalent, the actual angles formed in either case are evidently not identical. But the case in point is one in which the line of faulty projection is taken to make an angle with the line joining the centre of rotation and the point of fixation, equal to the angle

the distance from  $C'$  to the point on the other side at which the visual axis met the plane. No modification in the formula is therefore necessary in the case of latent squints.

If instead of taking the values of the different lengths  $d$ ,  $D$ , and  $m$  in millimetres, we make use of decimals of a metre, the constant factor  $10^3$  disappears and the formula still further simplified becomes

$$\frac{d}{Dm} = \text{Deviation in metre angles.}$$

It would not be very difficult practically to make the point of fixation occupy approximately the position  $C'$  on the central line  $CC'$ . To do so requires, however, some

formed between the latter and the line of deviation, and therefore the two lines will not cut the plane at equal horizontal distances from  $C'$ , the point of fixation. Let  $\theta$  = the angle of deviation  $\beta$  = angle between the perpendicular and the line of direction of the eye and  $\gamma$  = the angle between the perpendicular and the line of direction required for proper fixation. Then  $\theta = \beta - \gamma$

$$\therefore \tan. \theta = \tan. (\beta - \gamma)$$

$$= \frac{\tan. \beta - \tan. \gamma}{1 + \tan. \beta \tan. \gamma}$$

but

$$\tan. \beta = \frac{m}{S} = \frac{m}{\frac{Dm}{m \pm d}} = \frac{m \pm d}{D}$$

and

$$\tan. \gamma = \frac{m}{D}$$

$$\therefore \theta = \tan^{-1} \frac{Dd}{D^2 + m(m \pm d)}$$

which shows that as there are two values for  $\theta$  according as  $d$  is positive or negative, *different* values of  $d$  positive and negative correspond to the same angular change. When  $-d=m$  the formula becomes

$$\theta = \tan^{-1} \frac{m}{D}$$

*i.e.*  $\frac{m}{S} = 0$  and we have evidently the same formula as would be required for calculating the angular convergence corresponding to any length of  $D$ . Again when  $d=0$  there is no deviation. It is evident, as the sign of  $d$  has to be considered, that the central position  $C'$  must be known to get the angle of deviation (in circular measurement) from a determination of the length of  $d$ .



form of apparatus which will easily suggest itself. But such an arrangement is not necessary except for special purposes, because the formula holds good wherever the point of fixation be taken along the line through  $C'$  drawn parallel to  $XY$ . To prove this take any position

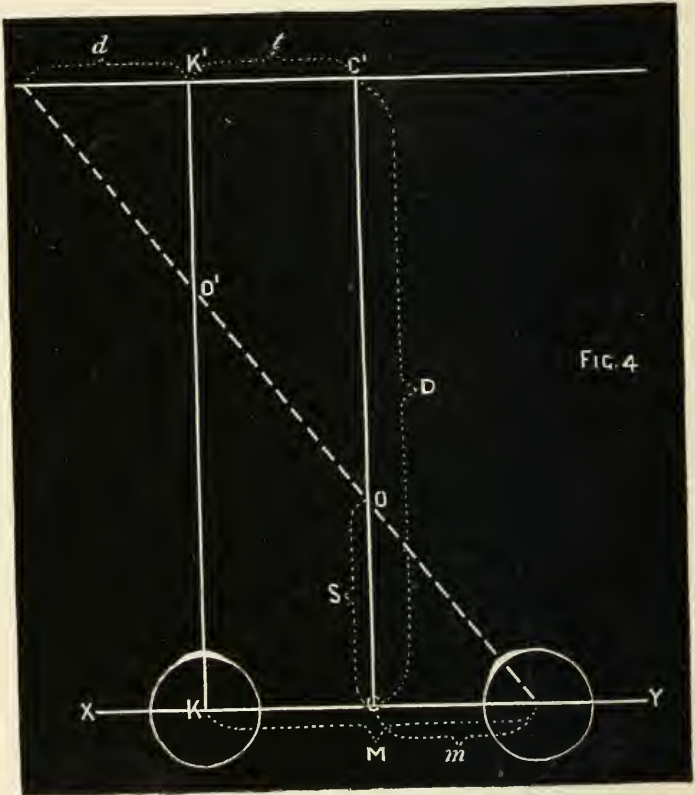


FIG. 4

along the line. If we call the distance from the point of fixation to  $C' \pm t$  we have in general

$$\frac{S}{m} = \frac{D}{m \pm t \pm d} \therefore S = \frac{Dm}{m \pm t \pm d}$$

From this we subtract in order to get the deviation, not  $\frac{1}{D}$  as before, but  $\frac{1 \pm \frac{t}{m}}{D}$ , which represents the number of

metre angles which would bring the eye to fix the same point as the other. Because the sum of the metre angles of convergence of the two eyes being  $\frac{2}{D}$  if the fixing eye is directed so as to make the angle  $\frac{1 \mp \frac{t}{m}}{D}$ , the degree to which the deviating eye ought, if properly directed, to converge is  $\frac{1 \pm \frac{t}{m}}{D}$ . The deviation is then, in general,

$$\frac{m \pm t \pm d}{Dm} - \frac{1 \pm \frac{t}{m}}{D} = \frac{d}{Dm} \text{ as before.}$$

(leaving out the sign which we have found to be unnecessary).

In the case figured in Fig. IV., one which readily occurs in practice, if a perimeter board be used  $t=m$ , and therefore the amount of convergence required by the deviating eye for correct fixation is  $\frac{2}{D}$ . It will be evident, however, that in the case of abnormal convergence the further the point of fixation be taken to the side of the fixing eye the nearer will the other be to the position of its extreme inward rotation, and consequently  $d$  in most cases tend to diminish in length as the fixation point is more in that direction. In the case of divergence the conditions are, of course, reversed. Practically, then, even when the value of  $D$  is small, the limits for the position of the point of fixation are not inconveniently restricted, if we take care to arrange that the position chosen is nearest the faulty eye in convergence, and nearest the normally directed one in the case of divergence. When again  $D$  is large, say from 4 to 6 metres, there is a great scope for the position from which the measurement of  $d$  will be the same, and consequently give by the formula the same value for the deviation according to the proposed notation in metre angles. When  $D$  is taken small it is hardly necessary to insist upon the importance of using some object for fixation which ensures accurate accommodation. By this method of examination and notation a great number of points

connected with muscular defects might be readily studied, such as the variation in the deviation with the length of *D* and the position of the point of fixation laterally, the relations of the double images in cases of strabismus with diplopia as compared with the actual deviations, &c.

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## CASES OF FOREIGN BODIES IN THE EYEBALL.

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CASE I. Unken, a labourer, aged 22, was admitted into the Eye Infirmary, Madras, with the following history :—

Towards the end of September, 1875, while standing near a man who was engaged in hewing a log with a hatchet, a fragment from the latter became detached and inflicted a wound below the left eye. Soon after the accident he applied at this hospital for relief from the pain. Nothing beyond the wound of the skin over the malar orbital ridge and an inflamed state of the eyeball was noticed by the surgeon in attendance. No foreign body was observed in the eyeball because of the inflammation and the opacities of the dioptric media. A small hypopyon having formed, the anterior chamber was tapped. The pain and inflammation having subsided under suitable remedies the patient was discharged from hospital at his own request.

On the date of his second admission on April 20th, 1876, the eyeball was found to have undergone atrophy, and to have shrunk within the orbital cavity ; the vision in the eye was entirely lost, and a little pain was complained of on pressure of the stump. The patient states that since the time of his discharge from hospital on the former occasion he has not had any pain or inconvenience in the opposite eye, the sight of which appears to be good. On everting the lower lid a piece of black metal was seen projecting from the eyeball in a downward and forward direction, and held very firmly in its

position by the structures of the eyeball, which have contracted and tightly enclosed the foreign body. The piece of metal was wholly hidden by the lower lid.

On April 22nd enucleation of the eyeball was performed. The vision of the right eye was found to be Sn. 10 at 10 feet and Sn. 1 at 14 inches.

The accompanying sketch shows the size and form of the piece of metal which was imbedded. Examination of the eyeball shewed absence of the lens, the retina and choroid amalgamated and condensed into a small black mass, and on the outer side of this a dense deposit of lymph and the thickened sclerotic, in the midst of which the fragment was firmly held.



The specimen is preserved in the Pathological Museum of the Madras Medical College.

CASE II. The subject of this case was a soldier, aged 32, who had completed 14 years of service. He was admitted into the Eye Infirmary, Madras, on October 14th, 1880, with the following history :—

“When on duty as a marker at the rifle range six weeks previously, he was struck by a splinter of a bullet from the target on the lower eyelid. It passed through this structure in an oblique direction upwards and inwards, making a ragged wound half an inch in length. After passing through the lid it struck the eyeball, wounding the conjunctiva and sclerotic, a portion at least having probably lodged in the organ. There was free bleeding at first and great pain, which made a minute examination impossible, but after the first 24 hours both completely ceased. Extensive chemosis followed; there was hæmorrhage into the anterior chamber, and almost complete loss of vision.”

“Since the first 24 hours there has not been the slightest pain or inflammation, but the condition of the eye has gradually got worse and vision is completely lost.”

The treatment in the regimental hospital consisted of a cold lotion, pad, and a light roller, rest in bed, and opiates at bedtime.

On his admission into the Eye Infirmary the injured eye presented the following condition:—The eyeball has atrophied; the lower lid presents a cicatrix, at which part there is considerable thickening, the eyelid being adherent to the eyeball. At the inner margin of the cornea there is a vertical cicatrix; the pupil is occluded by a deposit of lymph. Drawing upon the lower eyelid pulls upon the eyeball itself. Photophobia and lacrymation present.

The left eye is congested; the conjunctival and subconjunctival vessels are enlarged and tortuous; around the corneal margin there is a well-marked ciliary zone; palpation produces pain; pupil is inactive to light. T—2. Reads M.B. Eyes at 1·5 metres. (M.B. Eyes = Snellen's Miniature Bull's Eyes.)

After application of a weak solution of duboisine, by oblique illumination, the pupil is found moderately dilated; the iris, which has been slightly adherent to the lens capsule, has parted from its attachments, leaving at these points pigment deposits on the capsule, but has dilated evenly.

The optic disc is highly congested, the margin ill-defined; veins very full and tortuous, arteries somewhat smaller than normal; no other abnormal conditions.

Under chloroform the injured eye was enucleated. On separating the conjunctiva from the sclerotic a metallic body was found imbedded in the cellular tissue of the orbit, the tissues at this point being all glued together by inflammatory products. On section of the eyeball, the vitreous cavity was found to hold an old blood-clot. The lens was hidden in the clot and in the fibrinous effusion; the clot was firmly adherent, especially at a spot opposite to the line of incision into the sclerotic caused by the foreign body. The cellular interval between the sclerotic and the inner tunics is much thickened by the inflammatory deposit.

The foreign body which was removed was a piece of lead beaten out, very irregular in form and outline.

October 18th.—Since the operation the photophobia, lachrymation, congestion, and ciliary redness in the left eye have considerably diminished. The disc is still very hyperæmic, the veins being much enlarged, the margins of papilla badly defined. Vision very defective.

October 22nd.—Patient states that since removal of the injured eye the vision of the left eye has improved ; is able to distinguish objects about him more clearly.

October 28th.—With left eye reads M.B. Eyes at 11 feet readily ; experiences greater difficulty in seeing at night.

November 5th.—Since the 2nd inst. has been placed under the following course of treatment:—Quinine gr. 2 thrice daily, and Ung. Hydrarg., 10 grs., to be rubbed into the left temple twice daily. Is able to read M.B. Eyes this morning at 21 feet readily.

November 18th.—Has made considerable improvement in his power of seeing both by day and by night. Congestion of the external structures has abated. O.P. less hyperæmic, especially at its inner margin. Discharged from hospital.

CASE III. John J., aged 30, a European gold miner in the employ of one of the gold mining companies in the Madras Presidency, was admitted into the Eye Infirmary on March 8th, 1882, with the following history :—

On February 23rd, 1882, while in the shaft of the gold mine, endeavouring to dislodge a “jumper” which had become fixed in a hole which was being prepared for blasting, an explosion took place, caused by dynamite which had been placed in the hole by another workman who denied having placed it there. The patient was alone injured by the explosion, his face alone being wounded.

On admission the following was his condition :—A vertical wound on the right side of the nose and a small abrasion over the right brow. The right eyeball congested, especially in the ciliary zone. The cornea uninjured ; at its inner and lower margin a wound 2mm. in length, into which the iris had prolapsed and had become firmly adherent. The aqueous fluid was stained with blood. The pupil was inactive and semi-dilated.

Oblique illumination showed the lens structure unchanged ; the vitreous filled with blood, and a deposit of lymph occupying a position opposite to the external wound.

The ophthalmoscope failed to illumine the fundus of the eye. No increase of pain on freely palpating the eyeball ; no



perception of light in the eye; T+2. Profuse lachrymation and photophobia of the uninjured eye.

March 16th.—Frequent careful examinations of the eye were made during the past eight days, and eserine drops were employed daily. The pain, which prior to admission was described as being of a paroxysmal character and severe at times, was materially diminished within 24 hours after the first instillation of the drops. The patient, who reluctantly consented to the removal of the eyeball, made a good recovery from the operation. All sympathetic irritation of the left eye ceased on removal of the injured organ.

On dissection of the excised eyeball, the vitreous cavity was found occupied by a dark coagulum of blood; the lens was in its normal position and apparently normal in its structure; the ciliary body, corresponding in extent to the external wound, was thickened to a great degree by inflammatory deposit extending a considerable distance in both directions along the ciliary region. On washing away the bloody clot from the vitreous cavity, a foreign body was found lying at its lowest part. This proved to be a fragment from the rock which had been blasted by the explosion of the dynamite. It measured 5 mm. in length and 2 mm. in width.

The patient made a good recovery, and was discharged on the seventh day after the operation.

CASE IV. Moonoswamy, aged 31, a rivetter on the Madras Railway, was admitted into the Eye Infirmary on March 1st, 1882, with an injury of the left eye. While at work on the morning of his admission, a piece of steel said to have been three inches square flew off from a larger piece and struck him in the left eye. Some hæmorrhage followed, with complete loss of vision.

On admission, a wound of a semi-circular form was to be seen at the upper and inner quadrant of the eyeball, extending from the corneal margin into the adjoining portion of the sclerotic. The iris had considerably prolapsed into the wound and the lens structure was opaque. A cold pad and bandage were applied.

On the following morning the prolapsed iris was excised and the softened lens structure removed through the corneal

extremity of the original wound by Teale's suction curette. A little hæmorrhage followed the operation.

The pain was much relieved after the operation, and the patient was in comparative comfort. On the morning of the fourth day the dressings were removed, and the anterior chamber was now found to be filled with blood.

March 18th.—The blood still present in the anterior chamber, with little tendency to becoming absorbed. The eyeball tender to the touch and very irritable, producing a sympathetic irritation in the other eye. Removal of the eyeball, with the consent of the patient, was performed.

On dissection of the excised organ, the anterior chamber and vitreous cavity were found filled with blood, on removing which from the vitreous cavity, a piece of steel was found lying at the lower part of the ciliary muscle closely surrounded by and imbedded in lymph. The ciliary region throughout was coated by lymph, forming a false membrane, which could be removed from it by forceps.

All sympathetic irritation of the other eye subsided after the operation. After a week's residence in hospital, the patient returned home. The foreign body measured 12 mm. in length, 7 in width, and a  $\frac{1}{2}$  mm. in thickness.

*Remarks:* The following points may be noticed in the four cases above recorded :—In Case I. the size of the foreign body which remained buried in the eyeball and the length of time, viz., eight months, during which it so lay buried, without producing any symptoms of distress in the other eye. The complete disorganisation of the injured eyeball, and the implication of a large number of the ciliary nerves in the wound caused by the impaction of the piece of metal, were certainly sources of great danger. The character of the projectile most probably may have had something to do with its having remained so long passive. It was a sharp shaving of metal, with a sharp cutting edge which was highly polished, and so presented no directly irritating surface to the structures among which it lay so closely in contact.

In Case II. the splinter which wounded the eye was a piece of lead which had rebounded from, and had become flattened out by its impact against the iron target. The foreign body did not penetrate the tunics of the eyeball, but lay *external to it* in the cellular tissue of the orbit. This, however, was sufficient to set up conditions which secondarily produced a sympathetic inflammation of the left eye in the course of six weeks.

The eyeball was removed under the impression that the foreign body was within it. The removal of the injured organ in this case, even after decided sympathetic inflammation had supervened in the other eye, was productive of most satisfactory results. The patient recovered with normal vision. In reference to the treatment in this case I may state that I have found decided benefit from mercurial inunction in combination with quinine administered internally under similar conditions. As a rule, sympathetic inflammations are not often witnessed in the natives of India. I have met with very serious injuries of the eye followed by no bad results to the other eye. Natives of India recover from injury and operation in the majority of instances rapidly, a result due no doubt to their natural idiosyncracies.

In Case III. the patient was a plethoric, highly nervous European, in whom there was every likelihood of inflammatory action supervening. The removal of the eyeball was imperative owing to the increase of tension and the symptoms of sympathetic irritation so rapidly supervening after the accident. Eserine proved useful in subduing for a time the pain in the injured eye and inconvenience in the other eye. Atropine and duboisine had a contrary effect. The nature of the foreign body also proved that the operation of enucleation was necessary. It was a rough piece of granite, which, carrying with it some of the products of combustion, made it additionally irritating to the structures with which it came into contact.

In Case IV. the foreign body was a sharp piece of steel shaving, which was capable of inflicting a sharp cut wound. This lay within the eye for 18 days, giving rise to a moderate degree of irritation in the other eye.

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**LAQUEUR (Strassburg). Corneal Curvature. Ophthalmometrical Investigations. *Von Graefe's Archiv.*, XXX., 1, 99.**

These investigations were made by means of the ophthalmometer of Javal and Schiötz, which, though not so scientifically perfect as that of Helmholtz, is able to determine the radius of the corneal curvature correctly within one twentieth of a millimeter (*vide* O. R., Vol. I., p. 38).

The first point noticed is the well-known flattening that the corneal curvature exhibits towards the periphery; this is commonly less marked towards the temporal than towards the nasal side, and in most cases does not exist at all towards the upper periphery.

An astigmatic deformation was always observed when pressure was applied to the cornea by dragging or pressing upon the lid, and in one case a permanent astigmatism was produced by such pressure exercised by means of a pair of misfitting pince-nez. This observation confirms the accepted explanation of the marked improvement so many astigmatic patients experience by pressing a finger upon the eyeball.

The examination of three children under six weeks old demonstrated in two a normal radius, and only in one an abnormally small radius (6.75 mm.) This, so far as a conclusion may be drawn from three cases, would modify von Reuss' opinion that infants possess unusually curved corneæ.

The relation of corneal astigmatism to total astigmatism was determined in fifty eyes. In sixteen of these it was that of equality, and in fifteen more the difference was no higher than 0.5D. In only one case was the difference as great as 1.5D. In the thirty-four cases where a difference existed the corneal astigmatism was nineteen times greater, and fifteen times less than the total astigmatism. The latter was determined without atropinisation, so that in this respect something is wanting to the

completeness of the observations. Laqueur concludes from them that the value of lenticular astigmatism has been overestimated. He found it absent in one third of the cases, and especially in the higher degrees of astigmatism. It increased the astigmatism produced by the cornea in more than one-third of the cases, and acted as a corrective in less than one-third.

The results of Laqueur's measurements of the corneal radius in high degrees of ametropia are fully in accord with Donders' observation that such eyes exhibit no remarkable alteration of curvature. Two eyes differing 30D in refraction were found to have exactly equal corneal curvatures.

In six cases of keratoconus high degrees of regular astigmatism were found (from 5D to 15D), and Laqueur is inclined to believe that great benefit would be derived in most such cases from the use of powerful cylindrical glasses. This regular astigmatism can only in part be explained by the pressure of the lids, for in the case of  $As = 15D$  the horizontal was the more curved meridian.

Ophthalmometrical measurements of glaucomatous eyes led to somewhat unexpected results. Sudden rise of tension in the dead eye is known to flatten the cornea and to increase its diameters. No diminution, however, from the normal curvature was found in a series of old glaucomatous eyes, and repeated observations of individual cases during several months led to the same conclusion, viz., that the corneal curvature is not concerned in the refractive changes which occur in glaucoma. Also no change occurred in the corneal curvature when tension was reduced by physostigmin.

The increase in refraction which von Græfe observed after iridectomy in two cases of glaucoma is according to Laqueur a regular occurrence. In twelve eyes the increase varied between 0.75D and 4D. The permanent nature of this change differentiates it entirely, Laqueur considers, from wound astigmatism, and he suggests four hypotheses to account for it. (1) Increase of optic axis at the posterior pole of the eye. (2) Advance of the lens. (3) Greater curvature of the lens. (4) Greater curvature of the cornea. The first he rejects as the phenomenon is observed in the cured cases of glaucoma, and such ectasia could not possibly occur simultaneously with a diminution of tension. The second contradicts the well-known

clinical fact that after successful iridectomy the anterior chamber becomes deeper. The fourth is excluded by the results of Laqueur's present measurements, and he concludes accordingly that this increase of refraction depends upon a relaxation of the Zonula Zinnii, and the diminution of refraction observed in progressive glaucoma is caused by an increased tension of the same ligament. This conclusion he holds is supported by Priestley Smith's observations upon the narrowing of the circumlental space in glaucomatous eyes.

The examination of eyes before and after cataract extraction showed that considerable changes took place in the corneal curvature. In all the cases examined within the first fortnight after operation the vertical meridian was found flatter than the horizontal. Rather lower degrees of astigmatism were found in the measurements made between the end of the second week and the twenty-fifth day after operation. In this period the curious observation was made that the vertical meridian had increased in curvature since the operation; an occurrence which Laqueur considers quite inexplicable.

Knapp's observations upon the effects of tenotomy upon the corneal curvature are abundantly confirmed by Laqueur. No essential alteration is produced by the operations for strabismus.

Punctures and wounds of the cornea were naturally enough found to produce marked corneal astigmatism, but no such effects were observed to follow contusions of the globe. This latter observation is in complete harmony with Berlin's suggestion of a temporary irregular astigmatism of the lens to account for the defective vision that follows such injuries.

H. CULBERTSON (Zanesville, Ohio). A Method of Determining Ametropia by Prismatic Refraction. *Journ. of Amer. Med. Assoc.*, Jan., 1884, p. 1.

On the Value of the Prisoptometer in Determining the Degree of Myopia. *Amer. Journ. of Ophth.*, April, 1884.

The prisoptometer is a new instrument for the estimation of refraction. Its construction is essentially as follows:—An aperture, 3 mm. in diameter, in the centre of a revolving disc



of metal, is covered to the extent of exactly one half by the apex of a glass prism of low refractive power (about  $3^{\circ}$ ). A white circle 150 mm. to 200 mm. in diameter on a dark background is placed at a distance of 15ft. to 20ft. from the instrument. The patient, seated, looks through the aperture in the disc at the white circle, and, by reason of the action of the prism which covers one half of the aperture, sees it double. The refractive power of the prism and the distance between it and the white circle are so proportioned that in the case of the emmetropic eye the two images of the circle exactly touch each other without overlapping. If the images stand apart the eye is hypermetropic; if they overlap, it is myopic. The glass, which when held in front of the aperture causes the images to become exactly tangent, represents the amount of hypermetropia or myopia as the case may be. By revolving the disc the several meridians of the cornea may be tested in succession, and astigmatism, if present, detected and estimated. All that the patient has to do is to observe the two images of the circle and to reply to the questions whether they touch, overlap, or stand apart. The inventor states that even children answer satisfactorily, and that the instrument is a decided time-saver, as a few moments suffice for the determination of the refraction. The result may be confirmed by means of Snellen's types and the selected lens.

This instrument is, in principle, not very unlike the old optometers in which Scheiner's experiment—the production of double images by admitting the light to the pupil through two small apertures—was utilised, but the substitution of a prism for the double slit and the employment of a circle as a sight object appear to be great improvements, inasmuch as the estimation of the mutual positions of the images is thereby made easy and precise.

Optometers of the kind above-mentioned present certain well-known disadvantages as compared with test-lenses and types—namely, the difficulty of ensuring an exactly correct position of the eye in relation to the double aperture, the absence of a positive control over the patient's replies such as is afforded by the naming of the test types, and the absence of the simultaneous determination of the visual acuity. Experience must determine to what extent these drawbacks are outweighed by the merits of Culbertson's method.

In his second paper Culbertson records in detail the examination of 45 myopic eyes, first without, and then with, the use of a mydriatic in every case, in order to show what proportion the apparent M, estimated by the prisoptometer, bears to the actual M after paralysis of accommodation. The results obtained with the instrument were in every instance corroborated in the ordinary way with test-types. Thus, in 45 eyes, of 25 persons aged from 12 to 57,

Sum of M without mydriatics = D. 202.75.

„ with „ = D. 180.25.

„ difference = D. 22.5 = 88.9 per cent.

This gives the very satisfactory result that the apparent M, as estimated by the prisoptometer without mydriatics, was only about one-ninth greater than the actual M.

Contrary to what one would have expected, the amount of simulated myopia due to accommodative spasm was on the whole considerably greater in the older than in the younger subjects. The cases were, however, hardly of sufficient number to justify such an analysis, and the results appear more doubtful still when we see that four different mydriatics were employed, and that a table is given to show that the influence of each on the accommodation was different. Exception must also be taken to the author's use of the terms hyperopia and hypermetropia to indicate the differences of refraction between the less and the more highly myopic meridians in cases of compound myopic astigmatism. To partly neutralise a concave spherical glass in one meridian by placing a convex cylinder in front of it is, of course, a constant practice, but to speak of the eye as having a hypermetropia in this latter meridian is incorrect, and in a statistical research like the present extremely confusing.

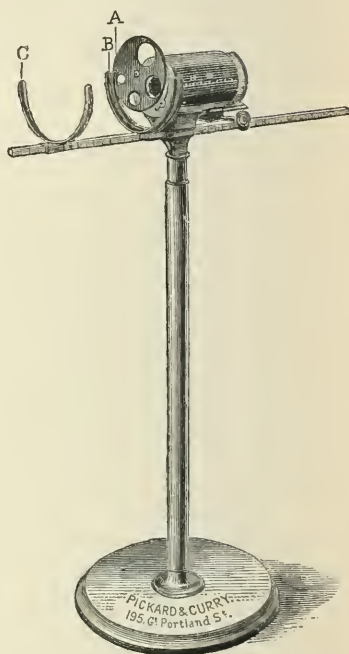
The instrument is manufactured by Messrs. Tiemann and Co., Chatham Street, New York.

W. ADAMS FROST (London). *An Artificial Eye, with some Practical Suggestions as to its Use.*

In this pamphlet the author describes and figures a new model eye, of simple but very complete design, and shows how by its use the optical conditions of emmetropia, myopia,

hypermetropia, and astigmatism may be studied with precision, and the rationale of the ophthalmoscope learned.

The refracting media are represented by a convex lens of 40 mm. focus. The length of the eye can be varied from 30 to 65 mm., so that the retina may be placed at, behind, or in front of the principal focus, its position being shown by a scale and pointer. Immediately in front of the lens is a rotating disc containing apertures of different sizes to represent the pupil; in front of this again are two clips A and B, placed respectively at 5 and 10 mm. from the lens, to hold the ordinary trial lenses in studying refraction. A third clip C, in front of these, travels along a graduated bar, and is intended to hold a lens, a ground glass screen, or an object with



which to form an image on the retina. The bar can be shortened, lengthened, or removed altogether. For the back of the eye are given a representation of the normal fundus and a ground glass on which are drawn a circle 4 mm. in diameter, and two lines at right angles to each other graduated in millimetres, for the study of the size of retinal images and the amount of the fundus visible under various conditions. For the convenience of those who do not possess the usual trial lenses, +10D., +8D., and -18D, spherical, and +5D. cylindrical lenses are supplied, in addition to a ground glass, and a screen with radiating lines for the study of astigmatism.

By a few practical experiments with such an instrument as this, the student would certainly learn the elements of physiological optics far more effectively than by much reading. The model-eye is made by Messrs. Pickard and Curry, from whom the descriptive pamphlet may also be obtained.

G. L. JOHNSON (London). *A New Method of Treating Chronic Glaucoma, Based on Recent Researches into its Pathology.* London: H. K. Lewis, 1884.

This work originated in a thesis for the M.B. degree, read at Cambridge in 1882, to which the author has "only added what was necessary to elucidate the subject as a whole, and to bring it up to the level of our present knowledge." It consists of three parts: the first dealing chiefly with facts historical, anatomical, and physiological; the second with recent pathological enquiries; the third with treatment.

The author makes frequent reference to the recent literature of his subject, but we notice, with surprise, that many passages having the form of original matter are, in reality, unacknowledged quotations from another writer, varied to some extent by alteration of wording. It is particularly distasteful to us to point this out in the present instance, but the offence is one which in the interest of medical literature cannot be passed over in silence.\*

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\* The following are some of the passages we refer to:—

G. L. JOHNSON.

P. 21. . . . It is no longer possible to doubt that this closure of the angle of the anterior chamber is the most fertile source of glaucoma. . . . The question we have now to discuss is the manner in which this closure is brought about.

In the healthy eye a stream of fluid is constantly passing from the vitreous to the aqueous chamber through the circumlental space, *i.e.*, the space which separates the margin of the lens from the ciliary processes.

P. 23. For we see that the periphery of the iris is bowed forward in a sweeping curve, in the concavity of which the enlarged ciliary processes accurately fit. The apices of the ciliary processes being rounded posteriorly by the suspensory ligament with which they are in contact

PRIESTLEY-SMITH. *Trans. Internat. Med. Congress, 1881. Sect. Ophthalmol.*, p. 84.

It is no longer possible, I think, to doubt that this closure of the chief outlet of the eye has an intimate connection with the causation of glaucoma. The question which we now have chiefly to discuss is the manner in which the closure is brought about. . . .

In the healthy eye a stream of fluid is constantly passing from the vitreous chamber to the aqueous chamber through the circumlental space—the space which separates the margin of the lens from the ciliary processes.

THE SAME. *Glaucoma, its Causes, etc.* London: Churchill, 1879.

P. 120 . . . . for we find the periphery of the iris bowed forward in an unusual sweeping curve, into the concavity of which the enlarged ciliary process is accurately fitted (fig. 17). The apices of the processes being bounded posteriorly by the suspensory ligament with

Under the head of treatment the author describes a simple operative procedure which he advocates as a substitute for iridectomy in chronic glaucoma, and which will be, undoubtedly, of great value if such results as are here recorded prove capable of attainment in the majority of cases. We quote the passage almost in full :—

“My method of performing the operation, which was originally suggested by Mr. Cowell and Mr. Rouse, is as follows :—

“The patient lies on his back on the operating table with the head slightly raised on a pillow. The surgeon opens the lids with the stop speculum and fixing the eye with the forceps, turns it inwards so as to expose as much of the sclerotic to view as possible. He then with the other hand gently thrusts a double edged modified Wenzel’s knife through the sclerotic into the vitreous towards the centre of the globe. The point of the knife is entered about 4mm. behind the sclerocorneal junction and should penetrate to the distance of about 1 cm. (nearly half an inch), the flat side of the instrument lying not quite parallel but somewhat oblique to the long axis of the eye. Any part of the globe will do, but it is better to avoid transfixing one of the muscles for obvious reasons. The knife is then *very* slowly withdrawn, and if the tension is high, slightly turned on its axis so as to allow the lymph freely to escape.

must, if they swell, advance forwards and inwards, and in so doing carry the periphery of the iris before them. . . .

P. 33 and 34. We will now conclude this part with the following propositions:— . . .

6. Under certain circumstances the pressure in the vitreous becomes greater than in the aqueous chamber; this causes the lens, suspensory ligament, and ciliary processes to advance in such a way that the angle of the anterior chamber is compressed and the escape of lymph retarded. . . . acute glaucoma is the result.

which they are in contact must, if they swell, advance forwards and inwards, and, in so doing, carry the periphery of the iris before them.

P. 147 and 148. From the foregoing facts. . . . we may, I think, . . . . derive the following general conclusions. . . .

4. Under certain circumstances the pressure in the vitreous chamber becomes greater than that in the aqueous chamber. . . . When this occurs the lens and the suspensory ligament advance in such a manner as to compress the angle of the anterior chamber and retard or arrest the escape of the intraocular fluid.

5. Glaucoma is the expression of this condition of obstruction.



The speculum is then removed, and the eye bandaged up with a cotton wool pad for 24 hours, or longer if necessary, until the wound has begun to heal up. Unless the vitreous be *very* fluid, a condition which is nearly always accompanied by grave structural changes in the choroid and retina, and which therefore is unfavourable to vision (even excluding the glaucomatous complication), the loss of vitreous need not be feared. Lymph always escapes, but the pressure being on the inside of the globe (in this case a fortunate coincidence), as soon as sufficient lymph has escaped to allow the tension to sink below normal, the natural elasticity of the walls themselves close up the wound and prevent any further loss of fluid. It is necessary, however, to withdraw the knife with care, else this very elasticity which is of so much use in closing up the wound, will, acting like a ball syringe, tend to 'squirt' out a portion of the more tenacious vitreous along with the lymphoid serum. No anæsthetic is needed, the pain of the increased tension being generally greater than that of the operation, and the relief is always immediate and generally permanent.

"I have performed this operation in six cases myself and have seen it performed in about ten more, while I have seen and taken notes of the after results of nearly as many other cases. In no case have I seen any bad results. My own cases and those of the surgeons at the Westminster Eye Hospital, who kindly performed the above operation several times at my request, are so satisfactory that I feel the results, although few in number, fully bear out what my theory anticipated. In every case that I have seen has there been an instant reduction of tension, which has frequently never returned, or when it has, a second (or in two cases a third) repetition of the operation has reduced it permanently to normal. In two cases of chronic glaucoma the results were exceedingly encouraging. In the first case, the patient from barely distinguishing light from darkness ( $V = \text{shadows only, or } \frac{20}{nil}$ ), which was the case just previous to the operation on Dec. 28th, 1881, a few weeks after the operation could see  $\frac{2}{3} \frac{0}{0}$  well and  $\frac{2}{2} \frac{0}{0}$ , *i.e.* full vision, fairly.

"In the second case (a woman, aged 42) a precisely similar result was obtained, the patient seeing  $V = \frac{2}{2} \frac{0}{0}$  fairly, or  $\frac{2}{3} \frac{0}{0}$  well, and reads J.  $1\frac{1}{2}$  at 16in., and when last seen six months after the operation no deterioration was detected. In several cases



the sight has been improved ; in all except one the tension was permanently lowered, while in none did the sight deteriorate subsequently."

The author calls the operation Scleral Paracentesis.

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## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JUNE 5TH, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

*Prevention of Blindness from Ophthalmia Neonatorum.*—The report of the Committee appointed to consider this subject, signed by Mr. Mason, Chairman, was read by Dr. Brailey. Twenty-three statistical replies had been received from Blind Institutions in response to a large number of enquiries issued. The four most explicit replies were from Institutions in Belfast, London, York, and Hull, and in these the cases of blindness due to ophthalmia neonatorum constituted from 30 to 40 per cent. of the whole number. These numbers agree substantially with those of foreign investigators.

The following resolutions, modified from those originally suggested by Dr. David McKeown, were recommended:—  
1. That the purulent ophthalmia of new-born infants being the cause of a vast amount of blindness, mainly because of the ignorance of the public regarding its dangerous character and the consequent neglect to apply for timely medical aid, it is desirable to instruct those in charge of new-born children by a card, in substance as follows:—

*"Instructions Regarding New-born Infants.*—If the child's eyelids become red and swollen, or begin to run with matter, within a few days after birth, it is to be taken without a day's delay to a doctor. The disease is very dangerous, and, if not at once treated, may destroy the sight of both eyes." This is to be distributed through the medium of the Poor-law and Birth Registration organisations of the United Kingdom. In England, the relieving officer, and in Scotland, the inspector of the poor,

should, in every case of labour under the Poor-law system, read to and leave with the person obtaining the order for medical aid, or the persons in charge of the patient, a copy of the card. In Ireland, the card should be attached to the order for medical aid in such cases, and the person who gives the order and card should, before doing so, read the card to the applicant. The registrar of births should read and hand to each person registering a birth a copy of the card.

2. That the advocacy and aid of the medical press be solicited in drawing general attention, and especially that of the authors of text-books on midwifery, of the lectures on the same subject for students and midwives, and of the various institutions which train, and charitable institutions which employ, midwives, to this important subject.

3. That a copy of the first resolution be forwarded to the respective presidents of the Local Government Boards of England and Ireland, and of the Board of Supervision in Scotland, and such other persons, if any, as may be necessary ; and that a deputation be appointed to wait upon the said presidents and other persons, if necessary, and urge upon them the official adoption of the views therein expressed, and to take such other steps as they consider necessary.

The report was adopted by the Society, and a deputation, consisting of Sir William Bowman, Bart., F.R.S., Mr. Jonathan Hutchinson, F.R.S., Mr. Brudenell Carter, Mr. Tweedy, Dr. McKeown of Manchester, and the Honorary Secretaries, Dr. Brailey and Dr. Abercrombie, was appointed to wait on the President of the Local Government Board.

*Unilateral Diplopia*.—Mr. Targett showed, for Dr. Brailey, a man, aged 56, who exhibited the phenomena described by Messrs. Gunn and Anderson at the last meeting of the Society. On the right side paralysis of the external rectus, with dilatation and immobility of the pupil ; a clear history of unilateral diplopia on this side, but only in the outer half of the field of vision. Now that the optic discs had become atrophic, this symptom was no longer noticeable. Perception of red and green was wanting. The right knee-reflex was much weaker than the left. Without any local cause, he had nocturnal incontinence of urine. He had none of the usual symptoms of

locomotor ataxy. He was probably suffering from constitutional syphilis.

*Tubercle of Choroid.*—Dr. Mules exhibited a coloured drawing of a typical example of miliary tubercle of the choroid, as seen with the ophthalmoscope, and microscopic sections of tubercles. The patient was a girl, aged 10, who died of acute miliary tuberculosis fourteen days after the apparent commencement of her illness. After death, miliary tubercle was found in the lungs, kidneys, liver, spleen, and cerebral meninges, as well as in the choroid. The drawing shown was made two days before death; there was double optic neuritis, and surrounding the disc in each eye were eight or ten circular nodules, yellowish white at the centre, and passing gradually at the periphery into the colour of the natural choroid. The surface of several of the choroidal tubercles was traversed by a retinal vessel. Dr. Mules thought that the ophthalmoscopic appearances, taken alone, were hardly sufficiently diagnostic of tubercle to separate it from other choroidal affections, notably the very early stage of choroiditis disseminata, but that, taken in connection with other symptoms, they afforded valuable confirmatory evidence.

*Serous Cyst of the Iris.*—Mr. W. Adams Frost exhibited, for Mr. Waren Tay, a case of serous cyst of the iris, in a man aged 28. Twenty-four years ago the eye had been injured by a fork, and the development of the cyst dated from that time. Ten years ago an iridectomy was performed. The cyst occupied the upper and inner quadrant of the anterior chamber, extending quite up to its periphery, and reaching about halfway across the pupil. The lower part of its posterior surface was lined by a layer of uveal pigment. The cyst itself was sufficiently transparent for a fundus-reflex to be obtained through it in several places. As bearing on the question of treatment, it was mentioned that, in a case recorded by Mr. Hulke (*Ophthalmic Hosp. Rep.*, vol. vi.), the increased size of the cyst gave rise to sympathetic irritation in the other eye, which subsided on excising the cyst. In other cases, on the other hand, its excision had been followed by loss of the eye from suppuration. As the cyst in this case was in contact with the cornea and lens, and extended quite up to the

periphery of the anterior chamber, its removal would probably be a matter of difficulty and danger.

*Sarcoma of Choroid.*—Messrs. Cowell and Juler exhibited a glycerine-jelly preparation and microscopic sections of a case of sarcoma of the choroid occurring in a woman aged 37. The case was shown at the meeting of the Society in March last, when the tumour could be seen with the ophthalmoscope in the upper and outer quadrant of the fundus. After the March meeting, the whole of the retina became detached, and the eye was excised. Up to the present time, there was no recurrence of the disease.

*Disseminated Choroiditis.*—Messrs. Critchett and Juler exhibited a living case of disseminated choroiditis occurring in a woman aged 46. There was a distinct history of syphilis, acquired five years ago. The case was peculiar on account of the great number of large and small yellowish-white patches distributed over the fundus, including the yellow-spot region of the right eye. The left eye had become totally blind three years earlier, presumably from the same cause. Very little pigment was to be seen, and the visual acuteness and visual field of the right eye were normal.

The President observed that the form of the choroiditis was very unusual, the small size and large number of the white patches being remarkable. He recalled one case which he had seen, where the patches were similar but not quite so numerous. It occurred in a young lady, aged 15, whose father had suffered from syphilis. There was no other trace of hereditary taint, but the patient recovered rapidly under antisyphilitic treatment.

*Concomitant Strabismus following Severe Scalp-Wound.*—Messrs. Critchett and Juler also showed a boy, aged 14, whose eyes became convergent four days after a severe wound of the scalp on February 7th. Diplopia. No loss of consciousness at any time. An excellent recovery from the scalp-injury, but the squint remained. The convergence was at first attributed to paralysis, but, on examination, the patient was found to be hypermetropic (5 D). The primary and secondary deviations were equal. The left field of fixation was normal, and the right only indicated a deficiency in the power of the external rectus. The squint was therefore considered to be chiefly concomitant.

Mr. Nettleship observed that the diplopia proved that the squint was of recent origin.

*Acute Optic Neuritis associated with Acute Myelitis.*—Dr. Sharkey read a paper, by himself and Dr. J. B. Lawford. A girl, aged 17, came under the care of Mr. Streatfeild, on November 23rd, 1883, suffering from severe double optic neuritis, with complete loss of vision. There was nothing noteworthy in the history, and no ground for suspecting syphilis. Vision began to fail, without evident cause, on November 9th, and was quite lost by November 13th. She had neither headache, sickness, paralysis, nor fits. Thirty-three days after vision failed paralysis began, with loss of sensation, first in the left leg, then in the right. Anæsthesia gradually spread up the trunk and involved the arms, and there was incontinence of the evacuations. During the latter part of her illness she was under Dr. Bristowe's care in St. Thomas's Hospital. Cystitis came on, the temperature reached 105° Fahr., and she died of peritonitis sixty-two days after vision first failed, and twenty-nine days after the first appearance of paralysis. At the necropsy, peritonitis, cystitis, and suppurative nephritis were found. To the naked eye the brain and its membranes, and the cerebral sinuses, appeared healthy, but there were softening and great congestion of the cervical region of the spinal cord over a space two or three inches in length. The rest of the spinal cord and its membranes seemed healthy. Microscopic examination revealed the presence of acute inflammation in the softened cervical region, in the columns of Goll above it, and in the lumbar enlargement, as well as in the optic nerves, discs, chiasma, and tracts. There was slight inflammation of the meninges about the chiasma, and on the under surface of the frontal lobes. The interest of the case lay in the association of acute optic neuritis with acute inflammation of the spinal cord. It had long been known that slight changes occasionally occurred in the fundus of the eye in cases of injury to the spinal column and cord, but it was only recently that acute optic neuritis had been noted with myelitis, independently of injury, viz., by Clifford Allbutt, Seguin, Noyes, Steffen, Erb, Dreschfeld, and Chisholm. Gowers and Dreschfeld had arrived at the conclusion that the optic neuritis and the myelitis were associated phenomena due to a common



cause, but that neither depended directly on the other; the case detailed supported this view, for the optic neuritis preceded the myelitis by a month, and there was no evidence at the post-mortem examination of any anatomical connection. Clinically, such cases were of great importance, as they simulated disease of the brain; and their occurrence, however rare, detracted somewhat from the significance of acute optic neuritis as a sign of intracranial disease.

Dr. Mules said that one of the cases referred to had been under his own care. The patient had been taken into the hospital under the impression that the neuritis was due to intracranial disease; subsequently, when incontinence of evacuations began, the patient was transferred to the care of Dr. Dreschfeld.

*Recovery from Amaurosis in Infants.*—Mr. Nettleship, in a paper founded on a number of cases of temporary blindness, or partial amaurosis, observed in infants, pointed out, first, that there was a fairly well defined group of cases where the amaurosis was not recovered from; in these sight was absent or defective from birth, several children of the same parents were often affected, and the parents were often akin; some of the patients were idiotic, others stupid or weak, others quite intelligent; the optic discs were either healthy or atrophied; in the milder cases, where sight was partly retained, there was often total colour-blindness; in cases of absolute blindness, the pupils might still react to light, which appeared to show that the centre for pupillary action in or near the corpora quadrigemina remained intact, although higher centres were absent or atrophic. In cases of amaurosis, where recovery was probable, the history was of great assistance; it was generally stated that the child could see well for some months or even a year or more after birth, that it lost its sight during an illness with cerebral symptoms, often diagnosed as meningitis; the optic discs, in the great majority of cases, were either healthy, or showed merely some slight doubtful pallor; frequently the power of walking, standing, or even sitting, was lost during the same illness. The blindness appeared to last from one to six months, and recovery took place slowly. He thought that in all these cases intracranial inflammation certainly took place, and perhaps spinal mischief as well. The mode by which



blindness was produced must remain in doubt until ophthalmoscopic examination had been made in the early stage of the blindness, as it was possible, though not probable, that papillitis might occur, and until post-mortem examination had been made during the time sight was lost; possibly, in some cases, the blindness might be produced by pressure of fluid accumulated in the ventricles, but this explanation would not serve for all cases.

In reply to Dr. McKeown, Mr. Nettleship said that he was unable to state whether the blindness was in any way connected with dentition.

Mr. Waren Tay thought it very difficult to determine whether an infant was blind or not. In one case, which he remembered, the infant had been brought to him as blind; ophthalmoscopic examination showed only that the discs were grey and the choroid thin, and he thought that in reality the infant could see.

*A Case of Uniocular Diplopia.*—Mr. Simeon Snell related a case of uniocular diplopia occurring in an elderly medical man. On looking at a telegraph-wire, a faint line was seen above the true line; the two objects were never seen side by side. The right eye only was affected,  $V = \frac{2}{3}^\circ$ ; not improved by plus or minus glasses; left,  $V = \frac{2}{3}^\circ$ , with Hm. 1 D. With both eyes looking at an object, the good eye, unless fatigued, controlled the bad one. The space dividing the "ghost" from the true line was only about three or four minutes of space, and therefore a line exceeding this amount in width would not appear doubled, but merely thickened and blurred. The subject, a scientific man, and conversant with optics, suggested as the cause irregularity in the curve bounding the crystalline lens, causing it to act like the divided object-glass of a heliometer. Mr. Snell, accepting the opinion that the diplopia depended on some alteration in the lens, asked whether the change in curvature, or irregular structure, or whatever condition it depended upon, was caused by the changes incident to the lens in presbyopia, presuming the diplopia corresponded with that period. Astigmatism, as far as examination went, was excluded.

*Living specimen.*—Messrs. Crichton and Juler showed a case of double lamellar cataract, in which artificial pupils had been made; that of the right eye by iridodesis, and that of the left by iridectomy.

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## A STATISTICAL REVIEW OF 1,767 CASES OF CATARACT EXTRACTION.

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The present paper is a record of cataract operations which have been performed by me from time to time during the past fifteen years. As far as I have been able, I have endeavoured to keep as accurate notes of each case as the time at my disposal permitted. In reading over my notes, I find that of late years the data recorded in my note-books are more full and exact than those of former years. Working as I have been in the East Indies, the largest number of my patients have necessarily been the natives of India, and consequently greater difficulties have presented themselves in obtaining precise statements of the quality of vision after an operation. Another impediment to obtaining reliable information on this point is the fact that no test-types exist, drawn up to any standard such as Snellen's, and constructed in the languages spoken in the East, which I need hardly remark are numerous. I have therefore contented myself in all instances by ascertaining from the more intelligent of my patients the distances at which the miniature bull's eyes figured in Snellen's Optotypi could be read. And in order to obtain uniformity in the results, I have applied the same test to subjects of all nationalities. In the case of children, and the ignorant who were unable even to count, I have judged of their vision by observing how minutely they



were able to describe ordinary objects of interest at various distances. Such cases I have classified under the headings of "good" and "fair" vision.

In recording these cases, I have omitted all those in which my notes have been scanty or incomplete, and in which no notice has been taken of the result. Again, it must be noticed, that the time which was allowed to pass before the vision was tested varied very much. Patients were tested on the day of their departure from hospital, which averaged three weeks after the operation. It is hardly necessary to observe, in reference to this point, that vision improves as time goes on and the eye gets stronger, and as patients become more familiarised with the use of spectacles. This I have constantly observed in those who have returned to the hospital after the lapse of some months or years for an operation on the second eye.

*The kinds of Cataract met with.*—I have classified these under the following heads :—Hard senile cataract ; the mixed or cortico-nuclear cataract ; the Morgagnian ; the congenital ; the lamellar ; the black ; the traumatic ; and the diabetic cataract. These have been met with in the following proportions :—

Hard senile cataract	-	-	489	or	27·67	per cent.
Mixed or cortico-nuclear	-	-	1002	„	56·70	„
Morgagnian	-	-	164	„	9·28	„
Congenital	-	-	59	„	3·33	„
Lamellar	-	-	12	„	·67	„
Traumatic	-	-	15	„	8·48	„
Diabetic	-	-	12	„	·67	„
Black	-	-	14	„	·78	„

Among the natives of India the *mixed cataract* is most frequently met with. I cannot assign any reason for this characteristic, and the fact may perhaps account for the greater frequency with which we meet with Morgagnian cataracts among the natives, the cortical substance having a more ready tendency to soften down into the milky fluid of the latter class of cataracts.

The Mahommedans consume larger quantities of butcher's meat, and their diet more nearly resembles that of the European; on the other hand, with the Hindoo, vegetables form the staple article of food, and it is among the latter class that the mixed and Morgagnian and diabetic cataracts are most frequently seen.

*Black cataracts* are noted to have occurred fourteen times, the depth of colour differing in different cases. In the greater number of cases, the vision after the operation was not first-rate; structural changes in the choroid were present, as seen by the ophthalmoscope. These cataracts were all very bulky and very hard.

*Congenital cataracts* were found in persons of various ages. A peculiarity is noticeable here, viz., in the advanced ages of some of those who applied for relief, from whom a history of blindness from birth was obtained; undoubtedly pointing to the conclusion that the cause of such blindness was due to a congenital defect. The lens capsule in some of the older cases had become cretaceous, and the lens structure had passed through similar calcareous changes. The vision in the more elderly patients after the operation was found to be of an inferior quality; whether from congenital defect in the structures of the fundus, or from functional loss of power in the nervous apparatus it was difficult to determine. It is highly probable that the latter may be assigned as the efficient cause in a large number.

The *Morgagnian cataract* was, as a rule, met with in very old persons, the percentage of these to the whole number being 9·28. The capsule was always readily removable by the forceps after the milky fluid and nucleus had escaped. These cases terminated very satisfactorily.

*Iridectomy as a step of the Operation.*—As regards Iridectomy in the operation of extraction, I have made a rule to avoid as much as possible any interference with the regularity of the pupil, and have performed iridec-

tomies only in 481 cases, or at the rate of 27·22 per cent. In this number, however, are included sixty-three cataracts extracted by Mooren's method, thirty-one by Graefe's operation, and six iridectomies for lamellar cataract. Deducting, therefore, these operations, which necessitate the performance of an iridectomy, from the total, the percentage is reduced to 22·12. I think the percentage might have been further reduced with advantage, for I believe that the lens can be removed with equal facility when the iris is entire and not tied down by posterior synechiae as when a portion has been excised. Nor do I think that when due precautions have been taken is there much likelihood of a prolapse of the iris, for in 1,169 operations in which the iris was left entire, a prolapse occurred 119 times, or at the rate of 11·79 per cent.

Nor do I think that the danger of iritis supervening is much enhanced, for iritis occurred in 7·93 per cent. of the operations performed according to Mooren's method, also in Graefe's operations, where the percentage was 25·80, and we may, therefore, reasonably conclude that the removal of a segment of the iris does not necessarily act as an absolute safeguard against the onset of iritis. The introduction of instruments into the eye to assist in the removal of the lens exerts, I believe, a greater injurious effect by bruising the iris, than the passage of the lens through a fully dilated pupil.

*Ages of the Patients.*—The greater portion of the cases of cataract occurred between the ages of fifty and sixty years, in the proportion of 38·03 per cent.; and between the ages of sixty and eighty in the proportion of 30·67 per cent.

*Vision after operation.*—As I have already remarked, the usual results obtained after operations are, as a rule, in the natives of India, unsatisfactory. Of those who regained their vision, 117 or 7·77 per cent. were able to read Snellen's miniature bull's eyes at six metres; 150

or 10·63 per cent. at five metres ; 516 or 34·28 per cent. at four metres ; 223 or 14·81 per cent. at two metres ; 357 or 23·72 per cent. recovered with "good" vision, and 132 or 8·77 per cent. with "fair" vision.

By placing these results under the heading of each operation we obtain the following results :—

	6 m.	5 m.	4 m.	2 m.	Good.	Fair.
Prim. cap. rup.....	6·72	13·78	42·68	15·12	12·77	8·90
Carter's oper.....	8·49	13·58	36·94	17·62	15·49	11·25
Leibreich's oper.....	13·54	2·08	35·41	16·66	20·83	11·45
Flap oper.....	"	"	"	"	92·22	7·77
Mooren's oper.....	7·54	9·43	32·07	18·86	13·20	18·86
Macnamara's oper....	24·0	2·0	40·0	20·0	8·0	6·0
Needle oper.....	3·57	3·57	7·14	3·57	82·14	"
Teale's suction.....	19·35	"	6·45	6·45	54·83	12·90
Rup. cap. by knife....	3·57	10·71	39·27	28·56	17·85	"
Graefe's oper. ....	"	"	6·88	3·44	75·68	13·76
Linear oper.....	"	12·50	"	12·50	56·25	18·75
Schult's oper.....	"	"	"	"	100·	"
Lamellar cat	Iridec.	"	"	"	100·	"
	Iridod.	"	"	"	100·	"

The inflammatory diseases after operation which caused, in the majority of cases, subsequent loss of sight, were Iritis, Keratitis, Suppuration of the eyeball, Haemorrhage into the vitreous and Secondary Glaucoma. Some of those attacked recovered, however, leaving in the cases of Iritis a false membrane, which was either Iridotomised or needled.

Iritis occurred in 235 cases or in proportion of 13·29.

Keratitis    "    143               "               "               8·09.

Suppuration   "    24               "               "               1·35.

Intraocular hæmorrhage in 8 cases or at the rate of ·45.

Sec. Glaucoma               13               "               "               ·74.

A more correct view of the frequency of each disease as it occurred in each form of operation may be gained from the table below :—

	Iritis.	Kerat.	Panoph.	Glauc.	Intraocular Hæmorrhage.
Prim. cap. rup. .... {	67	46	"	6	4
	9'94%	6'82%	"	89%	59%
Carter's ..... {	97	49	"	7	3
	17'04%	8'61%	"	1'23%	52%
Leibreich's ..... {	20	15	6	"	1
	16'52%	12'31%	4'95%	"	82%
Flap ..... {	"	10	6	"	"
	"	9'52%	5'71%	"	"
Mooren's ..... {	5	5	"	"	"
	7'93%	7'93%	"	"	"
Macnamara's ..... {	15	13	2	"	"
	23'80%	20'63%	3'17%	"	"
Needle oper. .... {	2	"	3	"	"
	6'37%	"	9'37%	"	"
Teale's oper. .... {	7	1	1	"	"
	20'0%	2'85%	2'85%	"	"
Rup. cap. by knife {	11	2	2	"	"
	32'35%	5'88%	5'88%	"	"
Graefe's oper. .... {	8	1	"	"	"
	25'80%	3'22%	"	"	"
Linear oper. .... {	2	"	2	"	"
	10'52%	"	10'52%	"	"
Schult's oper. .... {	1	1	2	"	"
	11'1%	11'1%	22'2%	"	"

*Anæsthetics.* — In 1054 cases an anæsthetic was administered. In the earlier part of my practice I omitted the use of anæsthetics except in occasional instances. Of later years I have always used some form of anæsthetic. The kinds employed have been Chloroform and the Bichloride of Methylene. I am not favourably impressed with the action of the latter drug; it is, I think, less to be relied upon than chloroform, and its administration is attended with greater risk. Patients, however, recover more rapidly from its effects than from chloroform, and, as far as I have observed, there is a less tendency to vomiting after its administration. No

special apparatus was used in the administration of chloroform; a metal nose and mouth-piece sufficed, lined with lint. The average amount of chloroform used in each case was 3ȳ. The only drawback to the use of chloroform is the liability to emesis, which, in those forms of operations in which the iris is left entire, is likely to produce a prolapse of the iris.

This will be more apparent from the subjoined table:—

	Ch.	Iris prol.		Ch.	Iris prol.
Prim. cap. rup...	654 97·03%	64 9·46%	Carter's op..	147 25·83%	33 5·79%
Liebreich's.....	9 7·43%	8 6·61%	Flap .....	55 52·38%	5 4·76%
Mooren's.....	50 79·36%	„	Macnamara ..	6 9·52%	5 7·93%
Needle op.....	14 43·75%	„	Teale's.....	32 91·42%	„
Rup. cap. by knife	34 100·0%	4 11·76%	Graefe's op..	27 81·69%	„
Linear op.....	12 63·15%	„	Schufft's op..	2 22·22	„

I have never seen a fatal result from chloroform administration in operations on the eye.

*Dressings.*—I have from time to time used a variety of dressings for cataract cases, and after an extensive trial I think that the dry dressings with absorbent cotton wool answer the best.

*Carbolic Acid Dressings.*—This was adopted in 201 cases. The instruments were previously soaked in a weak solution of carbolic acid, the retro-tarsal folds were syringed out with the same solution, the operation was performed under the carbolic acid spray, and the dressings were moistened with the solution. This plan was carried out on as nearly antiseptic principles as it is possible to do in operations on the eye. The results were not favourable, and the non-success of the majority of operations under these arrangements I attribute to the irritating action of the carbolic acid. I therefore abandoned this in favour of phenyl, which I was given



to understand was less likely to prove irritating to the eye, but I regret to say that I met with the same result. I therefore adopted the dry dressings with the absorbent cotton wool. The results, since I began this method of dressing, have been so favourable that I have continued to employ it. It is the one which is attended with least risk. This dressing was employed in 719 cases. In the earlier part of my practice I was in the habit of using cold water pads and bandages, but I cannot say that I was ever favourably impressed with the utility of the dressings. Cotton wool under the action of lotions and fluids becomes formed into a hard cake and does not adapt itself to the irregularities of the surface of the eyelids, etc., whereas the dry cotton secures a better adaptation of the divided structures and a more complete retention of the parts in their position. The absorbent cotton has a great advantage over the unprepared material, in taking up readily any discharges or humours which may escape from between the lids, keeping thereby the patient in a more comfortable state.

*Peculiarities in some of the cases.*—In thirteen cases a dense *pterygium* interfered with the operation, in some measure, as regards the corneal section, and caused a decided impairment in the acuteness of vision after the operation. In the East, *pterygium* is a very common affection of the conjunctiva, and shows itself in very aggravated forms.

In one case *leprosy* was present in a very marked manner, ulceration having removed the terminal phalanges of the upper and lower extremities, and the shape of the fingers and toes was changed by the contraction of the tissues and tendons, giving to the extremities the "bird-claw" appearance. This case suffered from iritis after the operation, which was of a very obstinate character.

Twelve patients suffered from *diabetes*. All these did well. The cataracts are usually of the soft variety, and were removed without much difficulty. Teale's suction operation answers well in these cases.

Four patients suffered from *elephantiasis* of the scrotum and upper and lower extremities. All these recovered from the operation. I do not think that the elephantoid state is a contra-indication to the performance of an operation for the removal of cataract. All these patients were very anæmic, and as a rule I have found that anæmic patients among the natives of India recover very well after an operation on the eye. It is perhaps remarkable, that some of my most brilliant results have been obtained in persons of an extremely anæmic condition. No inflammatory action set in, and the eye on the fourth day after the operation looked as if it had never been touched by a surgical instrument.

Two patients were notorious *opium eaters*. One of them had been addicted to the use of the drug for forty years, and at the time of his admission was consuming daily thirty-two grains of the narcotic. Before submitting him to an operation, I kept him in hospital for ten days, during which time I gradually diminished the amount, until I reduced it to three grains in a day. After the operation I prohibited its use entirely. On the seventh day the patient suffered from acute iritis, and was in great distress from the discontinuance of the drug. As his state of depression was alarmingly great, I permitted him the use of his stimulant, and simultaneously with its use, without other treatment, the iritis subsided rapidly, and he recovered with a very good eye. It is probable, that had he not been permitted to take his opium freely at this juncture, the result would have been unfortunate.

In thirteen cases *posterior synæchiæ* from former iritis complicated the cataract. In all such, a free iridectomy was performed, and the opaque capsule removed. In reference to the last point, it is as well to note that in 130 cases, or in 740 per cent., the capsule was removed with the lens. In some, escape of the vitreous followed the removal, but the results were, in the majority of cases, good. The vitreous was lost in 152 cases, or in the proportion of 866 per cent. This

occurred to the greatest extent in the following operations :—

Liebreich's operation in	29	cases or in	23'96	per cent.
Flap	15	„	14'28	„
Macnamara's	8	„	12'69	„
Carter's	67	„	11'77	„
Graefe's	4	„	12'90	„
Mooren's	3	„	4'76	„
Prim. cap. rup.	23	„	3'41	„

The introduction of an instrument to assist the exit of the cataract increased the tendency to the escape of the vitreous to a greater or less extent. In a great many cases, no serious injury appears to have been inflicted by such loss, but I am not sure whether the sight does not afterwards deteriorate. I have not had sufficient opportunity to form an opinion on this point.

In conclusion, I shall enumerate the different methods of operation which I have employed in dealing with the 1,767 cases which have come under my care.

*Lamellar cataracts.*—Twelve such have been benefited by the performance of iridectomy and iridodesis ; six having been iridectomised and six treated by iridodesis. No failure is recorded. All were young persons varying between five and twenty years of age. I am not in favour of iridodesis ; the risks are great ; the irritation in the eye caused by ligaturing the iris continues for some time after the operation ; the results were not so good as in those in which an iridectomy was performed ; and therefore in the future I shall always perform an iridectomy in preference to an iridodesis in cases where there is no tendency to advance of opacity in the cortical structure of the lens.

*Schust's Operation.*—Nine cases were submitted to this operation, six of which were successful. There is nothing of importance to note in reference to this operation, but as I think the introduction of a traction instrument within the eye carries with it serious objections, I am not in favour of such operative procedure.

*Linear Operation* was performed nineteen times. Of these sixteen were successful, or in the proportion of 84·71. All the subjects were between thirty years of age and under ; seven were congenital cataracts, and three were traumatic.

*Graefe's Operation.*—This was adopted in thirty-one cases ; two were failures. The recoveries from the operation were slow ; cystoid cicatrices formed in a few and gave rise to inconvenience. The two failures were from severe iritic inflammation. The successes were in the proportion of 93·54 per cent.

*Teale's Suction Operation* was employed in thirty-five cases, of which four were failures. The cases comprised three diabetic, twelve traumatic, and twenty congenital cataracts. The unfortunate cases were traumatic, and it may be surmised that the injury in the first instance most probably had a considerable share in bringing about an unfavourable issue. I think this method of operation a very useful and safe one in dealing with such cases as those I have named. The successes were in the proportion of 88·57 per cent.

*Needle Operation.*—This was confined to congenital cataracts, of which there were thirty-two. Of these, twenty-eight were successful, or in the proportion of 87·50 per cent. The ages of the patients ranged from six months to twenty years. The number of patients was twenty-four, in eight of whom the cataracts in both eyes were needled. The number of operations performed on each eye is as follows :—

5 needling operations in 1 case.			
4	”	”	5 ”
3	”	”	3 ”
2	”	”	9 ”
1	”	”	14 ”

In a few of the last of these cases the escape of the softened lens structure was facilitated through a small corneal section made by a broad needle.

*Macnamara's Operation* was performed sixty-three times. Of this number thirteen failed, or in the proportion of 20·63 per cent.

*Mooren's Operation.*—Sixty-three cases were operated on by this method, of which number ten were failures, or in the proportion of 15·87 per cent. The reasons for the adoption of this operation were, that

In 39 cases glaucomatous symptoms were present.

In 8 „ the large bulky lens caused pressure on the structures in the vicinity.

In 7 „ the patients were extremely debilitated.

In 5 „ posterior synæchiæ were present.

In 3 „ diabetes were present.

In 1 „ an injury preceded the formation of the cataract.

In persons suffering from general debility, or in those who were timid of undergoing an operation, the method commends itself by inflicting a less severe injury at one time on the eye, and affording it, thereby, a better chance of recovery. At the same time the patient becomes more reconciled to operative procedure, and is less likely to suffer from any shock. In those cases in which glaucomatous symptoms were present, or were impending, the performance of a preliminary iridectomy was forced to exert a decided influence for good, by primarily relieving the increased tension, and secondarily regulating the altered intra-ocular circulation.

All the cases in which this operation was performed were complicated ones, and demanded care in its performance. In three cases the cataracts were black and large, and as I had observed that the removal of such is sometimes succeeded by severe intra-ocular hæmorrhage, I have always judged it right to prevent the sudden removal of so bulky a body, and to leave time for the blood-vessels of the choroid to accommodate themselves to the altered circumstances by a preliminary removal of a segment of the iris.

I have not followed any rule as regards the interval of time allowed to lapse between the iridectomy and the

removal of the lens. The table below records the periods of such intervals :—

In	2	cases	2	years	elapsed.
In	1	„	15	months	„
In	1	„	9	„	„
In	1	„	8	„	„
In	3	„	3	„	„
In	2	„	1	„	„
In	6	„	18	days	„
In	10	„	14	„	„
In	4	„	10	„	„
In	33	„	7	„	„

The longer intervals noted above were in those patients in whom glaucomatous symptoms were most pronounced, and who, having been relieved of such symptoms and having recovered a certain degree of vision after the iridectomy, at the same time having vision in the other eye sufficient for ordinary purposes, were not anxious to return too soon to the hospital for the completion of the operation. I consider, however, that an interval of from seven to fourteen days suffices to meet the requirements of most cases. I have had reason to be satisfied with the results. Exceptional cases will necessarily demand a departure from the rule which I have usually observed.

*Flap Operation.*—The last occasion on which I performed a flap operation was on the 11th February, 1872. Up to that time I had performed the operation 105 times; of this number, ninety were successful, the failures being in proportion of 14·28 per cent. All the subjects were upwards of forty-five years of age. The recoveries from operation were tedious. Chloroform was administered to about one half of the total number. The vitreous escaped in no less than 14·28 per cent. The ciliary spasm which caused this disaster may in part be ascribed to the absence of an anæsthetic. The danger of loss of the vitreous is greater in proportion to the extent of the corneal section, and if to this is added the



spasm of the ciliary muscle, the liability to loss is augmented. Therefore, of late years, I have almost invariably administered an anæsthetic in extraction operations. I attach less importance to a prolapse of the iris, should vomiting occur after chloroform administration, than to a loss of the vitreous in any great amount. Some of the most brilliant results were obtained, however, after the old flap operation when no untoward circumstances interfered with the subsequent progress of the case. The operation is one most difficult of performance, and demands great care because of the accidents which are so likely to occur in the course of the operation. It has, I think, been wisely abandoned in favour of more simple procedure.

*Liebreich's Operation* was resorted to in 121 instances. Of these ninety-six were favourable and twenty-five were unsuccessful, or in the proportion of 20·66 per cent. of failures. In six cases an iridectomy was performed to facilitate the exit of the cataract. The direction of the incision through the cornea renders the removal of the cataract difficult, and the removal of a part of the iris and the employment of a vectis is incumbent to effect an easy escape of the lens. The vectis was used in 14·87 per cent., and there was an escape of the vitreous in 23·96 per cent. of the cases. The quality of vision was interfered with by the irregularity of the cicatrix in the corneal structure.

*Carter's Operation.*—This method of operation is described by Mr. Brudenell Carter in his work on Diseases of the Eye at page 386. For purposes of distinction I have designated this method of operation by his name. It was employed in 569 cases, of which ninety-eight were failures, or at the rate of 17·21 per cent. In following the steps of the operation, as laid down by Mr. Brudenell Carter, an iridectomy did not invariably form a part of the operation, a segment of iris having been removed in 29·4 instances. In those who recovered, vision was very good, the improvement in quality of visual power over

the other forms of operation being in a great measure due to the small interference with the refracting surface of the cornea, and the absence of distortion of the images on the retina caused thereby. The improvement in visual power, as witnessed after this operation, was no doubt due in part to the fact that in 15·11 per cent. of the cases the lens was removed in its capsule. At the same time that an advantage is gained by the removal of the lens capsule in a decided improvement in vision, it must not be forgotten, that there is a greater liability to the escape of the vitreous, for in the cases in which this was tried the vitreous escaped on sixty-seven occasions, or in the proportion of 11·77 per cent. The loss of vitreous does not, therefore, necessarily interfere with the quality of vision at the time; but I cannot help thinking, that if cases were followed for some time after such an accident and submitted to examination, considerable deficiencies would be found to exist, for it is noticeable, that six such returned on account of chronic glaucomatous changes which had supervened.

*Primary Capsule Rupture* is the name by which I have designated this method of operation. I have so named it because the initiatory step of the operation is a division of the lens capsule by a stop needle, the pupil having been previously fully dilated by atropine. This plan I adopted at first in the case of Morgagnian cataracts, in order to gain a more exact knowledge of the size of the nucleus, and accordingly to limit the section through the cornea. The risks attending the removal of cataracts are hereby greatly lessened, and the escape of the cataract is facilitated. I have subsequently applied this method of operative procedure to all kinds of cataract and I think the results have justified a continuance in the operation. In no other kind of operation can either so large a surface of the lens capsule be exposed for division by the cystotome, or the iris be kept away from the lens and be rendered less liable to an injury in the division of the capsule.

As soon as the nucleus in a Morgagnian cataract has escaped into the anterior chamber, it can be more readily examined as to its size, and the corneal incision can be more accurately made to permit of the escape of that body. The successful results which were obtained by this process in the case of Morgagnian cataracts induced me, as I have said, to apply the method to all forms of the disease, and I think I am justified in saying that the operation for extraction is by this means facilitated and made more simple.

The advantages of this plan may be summarised as follows :—

1st. It allows a more extensive laceration of the capsule at the same time that the anterior chamber remains replete with its fluid.

2nd. It permits of a more complete exposure, and a more thorough knowledge is gained of the size and character of the cataract.

3rd. It diminishes the tendency on the part of the iris to contract, even after the corneal section has been completed, and by this means facilitates the escape of the lens.

4th. By it, the possibility of more accurately judging of the extent to which the cornea must be divided to permit of the escape of the lens is obtained.

5th. The less necessity there is for the introduction of a traction instrument to effect the removal of the lens, and the less interference there is with the natural position of the structures of the eyeball.

This operation which I now almost invariably perform, if no strong reasons contraindicate its adoption, has been performed by me 674 times, of which seventy-nine, or at the rate of 11·72 per cent., proved unsuccessful. Of this total number, 101 were Morgagnian cataracts. The iris was excised in only seventy-five cases. Chloroform was administered in 654 cases and the iris prolapsed in sixty-four cases, or at the rate of 9·46 per cent., the latter accident being due in several cases to the vomiting after the

exhibition of the anæsthetic. Glaucomatous change occurred on six occasions, but this cannot be attributed directly to the operation.

In my further endeavours to render the operation for extraction still more simple, I laid aside the needle for the division of the lens capsule, and in thirty-four cases effected the capsule division by means of the cataract knife before completing the transfixion of the corneal tissue. Of this number six proved unsuccessful, or in the proportion of 1/64 per cent. In the endeavours to divide the capsule of the lens fully, the iris is more liable to be injured and the lens structure cut into and broken up, so that iritis occurred in greater frequency, as the foregoing tables show. As no corresponding advantages were to be gained by this treatment of the lens capsule, I abandoned it in favour of the division by the needle, prior to making the corneal section.

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## RARE TUMOUR OF ORBIT.\*

BY JOHN B. STORY, F.R.C.S.I.

The small tumour which I have to describe was removed from the left orbit of a healthy young girl, who presented herself some weeks ago at St. Mark's Ophthalmic Hospital, with the following history. She had always been healthy, and had never suffered from any inflammation or painful affection of the eyes or orbits, but all her life—that is to say, as long as her memory carried her back—she had noticed a small lump situated underneath her left lower eyelid towards the nasal side of the lid. This little lump became more prominent at certain times, and slightly discoloured, the discolouration being of a bluish hue, and the increase of size and change of colour being specially noticeable when she laughed or cried, or after stooping or taking violent exercise. Upon such occasions it sometimes became painful as well as prominent and

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\* This paper was read, and the specimen exhibited, before the Pathological Section of the Academy of Medicine in Ireland, May 2nd, 1884.

discoloured. These changes bore no relation to the periods of the menstrual flow, and they were observed at an age when menstruation had not appeared at all. The girl was twenty years old when she consulted me; the little tumour had only been a cause of actual trouble and anxiety for a few months previously.

On inspection, a small patch of a bluish hue could be observed below the margin of the left lower lid towards the nasal side. When the girl looked upwards this patch became more prominent, but it was at all times slightly raised above the level of the surrounding skin; when she stooped down for a few moments the swelling very considerably increased, and the bluish hue became more intense. On palpation with the finger, a hard body, about the size of a small pea, could be felt beneath the discoloured skin. This little tumour felt stony hard, and was freely moveable in all directions in the orbital cavity. It could even be drawn forwards and made to project over the bony edge of the orbit upon the cheek, but I was not able to make it project through the fornix conjunctiva beneath the eyeball. There was no evidence of anything really serious or dangerous about the tumour, but the patient being anxious to have it removed, and I being anxious to see what it was, I proceeded some days later to extract it through a small incision in the skin at the border of the orbit. No difficulty was experienced in its removal, but there was a somewhat unaccountable and unexpected quantity of venous hæmorrhage. On dividing the skin and subjacent fascia, I easily made the tumour project through the opening, but it was enclosed in a firm though thin capsule, which had to be divided before it could be removed. On dividing this capsule the tumour popped out on the cheek, as an orange pippin does when squeezed between the finger and thumb of a school-boy. There was no pedicle whatsoever, nor any connection which I could discover with any of the neighbouring tissues. The bleeding was staunched, and the wound healed by so-called first intention; but so far as the patient's comfort is concerned I cannot state that the operation has proved a success. When she stoops the swelling of that portion of the soft parts in the orbit occurs to as great an extent as before; and there is also to be seen a swelling of the upper portion of

the orbit which I did not observe before the operation, although it is possible that it existed. Only in one respect can she be said to be better, namely, that the bluish colour of the skin has disappeared.

The tumour was nearly spherical, measuring in its longer diameter about 1 cm, and in the shorter one about 7 mm. At one extremity of the longer diameter a smaller spherical tumour, about 2 mm in diameter, was firmly attached to the primary one. The whole mass was bony hard, and could not be cut with a scalpel. My friend Mr. Arthur Baker kindly made a section of it with a fine saw, and we found that it was solid throughout, and formed of a series of irregularly concentric lamellæ of different shades of grey and white matter, the whiter layers being apparently more dense and firm than the grey. The peripheral layer resembled bone in external appearance, and passed without interruption between the tumour proper and the little excrescence on its surface. This smaller tumour was surrounded also by a similar hard whitish layer.

The microscopical examination of a section rubbed down upon a hone does not, however, countenance the view that the outer wall is a bony formation, for all that can be seen in the preparations I have made is a series of different layers of what is apparently fibrous tissue and calcified matter of uncertain nature. In some layers there are appearances resembling cellular conglomerations, but there is certainly nowhere anything that can be taken for either bone or cartilage.

The tumour which I have described is certainly an extremely rare one in the situation from which it was removed. In the literature at my disposal I have been able to discover a record of only one case at all resembling my own, and in this the description is not in all respects very satisfactory. The case is quoted in Berlin's admirable article upon diseases of the orbit in the handbook of Græfe and Sæmisch. The tumour was removed by Fano, who described it as an osteo-fibro-cartilaginous growth. It was considered to have been present since the earliest childhood of the girl from



whose orbit it was removed, and had grown slowly in size till she reached the age of 23, when it was about as large as a small nut. It lay in the orbit towards the inner canthus underneath the lower lid, was exceedingly hard to the touch, and was freely moveable in all directions. After the superjacent soft parts were divided it came forwards and fell out upon the cheek of its own accord. Berlin gives Fano's description of its pathology in the original French. "The tumour was surrounded by a cellular membrane which separated from it easily. Divested of this capsule the tumour was whitish in colour, and so hard that it could not be divided by the blade of a strong scalpel. An antero posterior section presented a series of lamellæ enclosed one within the other, the periphery being formed by a greyish white band resembling fibro-cartilage, which appeared on microscopical examination to consist of an amorphous substance, a number of fibres crossing each other in different directions and cartilage cells."

Berlin's criticism upon this description is to the effect that it is too defective to afford us a clear idea of an orbital enchondroma, in which category he seems inclined to place the tumour, except for the fact that no evidence is obtainable of the existence of such tumours except this very remarkable case of Fano's. Now, without wishing to doubt the accuracy of Fano's microscopical observation, I cannot but believe that the tumour described by him is identical in origin and pathology with that described and exhibited by myself. The presence of cartilage cells in his tumour is the only real point of difference, for though he calls the tumour an osteo-fibro-cartilaginous growth, he says nothing in the pathological description of the existence of any bony tissue in the new growth. The preparations I have made are not very excellent, but if any tissue resembling cartilage had existed in the tumour it could not fail to be demonstrated in these preparations. The absence of cartilage cells in the tumour I have exhibited makes me

suspect that Fano too hastily assumed that cellular conglomerations were true cartilage cells. This, in my tumour, they certainly are not.

It has been suggested to me that the tumour may possibly be of the nature of a phlebolith, and I must confess that this is the only theory as to its nature which seems to me probable. In microscopical appearances it does not differ from such bodies, and the bluish discolouration of the skin, the marked venous hæmorrhage during the operation, and the occurrence of swelling in the orbital soft parts when the patient does anything likely to increase the pressure in the orbital veins, all point strongly to the existence of some vascular anomaly in this situation.\*

F. C. DONDERS (Utrecht). *Colour Systems. Von Græfe's Archiv., Vol. XXX., Part 1, p. 15.*

The theory of colour vision proposed by Hering, which is criticised in this paper, postulates six fundamental visual sensations arranged in three pairs, black and white, blue and yellow, green and red. These are all related to a single visual substance, so that its dissimilation (D) and assimilation (A) are connected with each of the three pairs, and this substance may be homogeneous or made up of three different substances, black-white, blue-yellow, red-green. D and A take place in each of these three substances, but are more intense in the black-white owing to its higher development.

All light waves act as D upon the black-white substance, but in different degrees; upon the blue-yellow and red-green substances only certain waves act as D, and other waves do not act at all.

Mixed light appears colourless, as it acts equally upon the blue-yellow and red-green substances; its effect upon the black-white substance, therefore, is manifested without interference.

\* The tumour was referred to the Committee of Reference upon morbid growths, whose report will appear in the Transactions of the Academy.

Two kinds of light which together produce the sensation of white are not to be regarded as complimentary but antagonistic, as they do not combine to produce white, but allow white to appear by mutually destroying the sensations proper to each other.

The three substances correspond to three kinds of D-irritability, and A-irritability of variable intensity, so that the same mixed light may appear darker or lighter, colourless or coloured, according to their relations, *i.e.*, according to the disposition of the seeing organ.

The nature, then, of a colourless sensation (its brightness or darkness) is determined by the relation in which the intensity or extent of the dissimilation of the visual substance stands to its simultaneous assimilation. Brightness and darkness are independent of the absolute quantity of D and A, which but determines the intensity (*gewicht*) of the corresponding sensation. The clearness with which each individual relatively simple sensation asserts itself depends upon the relation between its intensity and that of the total intensity of the resulting or combined sensation.

Hering's psycho-physical law then is:—The clearness or purity of any sensation (or presentation) depends upon the relation in which its intensity (*gewicht*), *i.e.*, the intensity of the corresponding psycho-physical process, stands to the total intensity of all contemporaneous sensations (and presentations), that is to the sum of the intensities of all corresponding psycho-physical processes.

Donders first devotes himself to a detailed examination of a critique by Hering upon a former article of his (*Von Graefe's Archiv.*, XXVII, 1.), and shows the mistakes into which he considers that Hering has fallen with regard to his attitude towards the theory of opposing colours (*gegenfarben theorie*). He denies that he has accepted most of the principles of that theory, and points out that the principles referred to are not peculiar to that theory but common to all theories, and that the dissociation and regeneration of molecules of which he has written has nothing in common with Hering's dissimilation and assimilation, having no direct psycho-physical import whatsoever.

Hering's statement that Donders has attempted to alter the theory of opposing colours in two points is based upon the following passage in Donders' first article. 'The sensation of white is associated with complete dissociation of the molecules. It has the peculiarity of being able to continue unaltered in quality and without tending to produce secondary sensations when it is moderate in intensity. It can remain even quantitatively unaltered for a considerable time when dissociation and regeneration of the molecules balance each other. By removal of light the sensation of white gradually changes into that of black, while the process of regeneration is more active than that of dissociation. Donders points out that he sees no causal nexus between this increased regeneration and the sensation of black, as Hering assumes to exist in the case of his dissimilation, and shows that he does not connect the state of equipoise between dissociation and regeneration with any definite degree of brightness, but only with the persistence of a sensation of brightness, be its degree what it may. Hering, however, disputes Donders' statement that definite degrees of brightness can remain for a considerable period unaltered, basing his opposition upon the phenomena of secondary images. This point Donders explains by observing that he never supposed that that two portions of the organ of sight when exposed to lights of different intensity remain in similar states, even although in each of them dissociation may balance regeneration.

Hering does not make the red-green and blue-yellow substances in all points analogous to the white-black substance. While in the latter the processes of D and A, and their corresponding sensations, have each their due value in each other's presence (*machen sich nebeneinander geltend*), and by their union produce all intermediate states, in the former the processes of D and A and their corresponding colours red and green, blue and yellow are antagonist, mutually excluding each other. This is one of the weakest points in his whole theory, and is in itself, as Donders points out, sufficient to destroy the hypothesis of opposing colours.

Donders, on the contrary, connects the sensation of the simple colours with partial dissociation of the same molecules. Consequently, complimentary colours appear, because, after the

primary partial dissociation, molecules remain whose secondary dissociation evokes the complimentary colour. This theory explains easily the existence of mixed colour sensations like yellow-greens and blue-greens, and also the fusion of complimentary colours into a sensation of an altogether different quality, viz., white, while to Hering it is impossible to account for this fusion. As with white and black, mixtures of red and green should always permit us to perceive both colours in the mixture, if Hering's law of D and A as applied to the white-black substance is to be applied also to the red-green substance.

But what right has Hering to assume that assimilation has any psycho-physical import whatsoever? It must be remembered that the formation of living molecules is universally merely the condition for their destruction (*Umsetzung*), and never in itself a stimulus or source of any vital phenomena. The storing up of potential energy does not appear as a form of consciousness. The sensation of black has, says Hering, been completely overlooked as regards its psycho-physical correlation. To this Donders replies that the sensation is given in the mere existence of the living molecules, and the movements of the atoms and of the groups of atoms without dissociation.

An extremely weak point in Hering's theory is the connection he assumes between the action of coloured light and assimilation. Why should rays of one wave length produce dissimilation and rays of another wave length assimilation? We know that all light-waves produce dissimilation in the retina in the destruction of the visual purple, though not all with equal rapidity, and we have no evidence whatever of any assimilation produced by the action of light. It is true that substances are known to exist which become oxydised by the action of red or yellow light, and reduced by that of violet light, but these are all inorganic substances, so that we can hardly avoid the assumption that each of Hering's opposing colours must evoke a process of dissimilation in the central organ. What conception he has of the action of light upon the retina, and its transmission through the nerve fibres, so that certain rays produce D and others A as final processes, is unknown to Donders.

The phenomena of successive and simultaneous contrast are of course easily explicable by either the theory of Donders or that of Hering.

The phenomena of colour blindness are fully in harmony with the theory of Thomas Young. The so-called dichromatic system of the colour blind has the effect of producing in their spectrum a neutral band which lies in the blue-green, to either side of which but one colour is visible in a greater or less degree of saturation. The proof of this is that by altering the saturation or the intensity all warm colours can be equalised on the one side of this band, and all cold colours on the other side. Also mixtures of warm and cold colours from all parts of the spectrum in appropriate relations produce white.

Two classes of colour-blind individuals have long been recognised: one possessing normal and the other diminished sensibility for the less highly refrangible rays of the spectrum, these naturally corresponding to red blindness and green blindness, and lately a third class has been described in which the phenomena can be best accounted for by the presence of violet blindness. Rose's observations upon the variable position of the so-called black point in the colour chart do not invalidate Young's theory, but merely tend to show that the explanation of colour blindness is not to be sought in the absence of one of the fundamental colours. The existence of the two principal types of colour blindness characterised—the one by a diminished sensibility for the red rays of the spectrum, and the other by a diminished sensibility for the green rays, has been sufficiently established by the observations of Donders himself, V. Kries and Küster, Seebeck, Preyer, Holmgren, and others, and the theory of Hering is utterly inconsistent with this fact.

The following are the results of Donders' examination of colour vision in the periphery of the retina. About  $40^{\circ}$  to the temporal side of the fovea colour vision is approximately the same as that of the green blind, but towards the nasal side it is necessary to use weaker light to obtain similar results. No zone of absolute colour blindness could be demonstrated even at the very periphery of the field of vision. Donders' conclusion is that there is from the centre towards the periphery a gradual approximation to the dichromatic system, first to that of the green blind, and then to that of the red blind, until at



the extreme periphery the latter system is present in its most incomplete form, that is approaching to achromatopsia when colours of extremely feeble saturation are employed. The difference between the colour vision of the colour blind and that of the periphery of the healthy retina consists in this, that colours are differentiated at the periphery of the retina which the colour blind are utterly unable to distinguish. Peripheral colour vision can then be hardly otherwise conceived than as the normal system in a state of incomplete development.

The hereditary character of colour blindness lends strong support to this idea. It is transmitted not directly from fathers to sons, but to grandsons, its occurrence being therefore an example of reversion or atavism. This is an important point. Reversion is generally to be looked upon as the occurrence of an earlier stage of development, and we may conceive that the evolution of the normal system out of the dichromatic system first occurred in the female, to be perhaps at first transmitted only to that sex, and gradually in course of time to appear in the less complex organisation of the man.

W. GOLDZIEHER, *Streptothrix Fœrsteri* in the Canaliculus Lachrymalis. *Centralblatt f. Augenheilk.* Feb., 1884, p. 33.

The author describes the microscopical appearances observed by him in a small concretion which was blocking up the lower canaliculus lachrymalis of the right eye of a girl aged 6. Preparations made of this substance, both unstained and stained with various pigments, presented felted masses of extremely fine delicate threads which never formed straight lines, but always exhibited many bends, were often twisted like corkscrews, and occasionally seemed to divide into fork-shaped extremities. They accordingly differed markedly from *Leptothrix buccalis*, of which not a single example could be discovered in any preparation. The thickness of the threads did not alter along their course, except that their ends were usually somewhat pointed, and the material of which they were made was either homogeneous or apparently formed of darker-coloured short rods, seen only when examined by high powers. These short rods occupied then the entire thickness of the

threads, and were united by a paler interstitial material, so that when lower powers were used the whole thread appeared to be homogeneous. The length of the threads varied greatly, but few were over 0.04 mm. in length, and their thickness only varied between very narrow limits. Between the threads there were seen minute points and collections of bodies like micrococci, with indefinite detritus; but all these bodies were far outnumbered by the threads, which formed the principal part of the whole concretion.

Goldzieher holds this "*Streptothrix*" to be quite distinct from the *Leptothrix buccalis*, which so many text books describe as the cause of these lachrymal concretions, and considers it to be identical with the *Streptothrix Færsteri* described by Cohn (Beitragen zur Biologie der Pflanzen, Heft III., s. 187). The two species are defined as follows:—*Leptothrix buccalis*. "Trichomata rigidula, linearia vel inflexa, non moniliformia achromatica, extremitatis obtusis, basi in stromate amorpho adhærentia." [Robin.]—*Streptothrix Færsteri*. "Filamenta leptothrichoidea, tenerrima, achroa, non articulata, stricta vel anguste spinalia parce ramosa." [F. Cohn.]

Goldzieher found a cilium embedded in the centre of the concretion, and hazards the supposition that some such foreign body as this—epidermis. scabs, or portions of linen, &c.—forms a nucleus round which fungoid growths develop in these situations. He is inclined to believe that most of the published cases of *Leptothrix buccalis* in the tear passages are really instances of the occurrence of the *Streptothrix* erroneously diagnosed as the buccal *Leptothrix*.

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H. E. JULER (London). *A Handbook of Ophthalmic Science and Practice.* London: Smith, Elder, and Co. 1884.

This work fully justifies its name; it is well abreast of recent scientific advances, and it is of thoroughly practical character. The pathology and morbid anatomy of the principal types of disease are concisely set forth and illustrated by excellent plates; the explanations of operative treatment are clear and well illustrated. There are eighteen chromo-lithographs of the fundus oculi, most of which are excellent.

The chapter on Refraction is written by Mr. Juler and Mr. Adams Frost together, and the latter contributes an interesting chapter on the somewhat abstruse subject of colour-vision.

We find very few passages in the book which justify anything but favourable criticism. Charcot's diagram of the imaginary second crossing of the optic nerve fibres in the brain might perhaps be omitted with advantage in another edition; the doctrine has been only too well learned already and should now be unlearned. The shadow-test is explained and illustrated solely with reference to the *concave* mirror; we ourselves feel not the slightest doubt that the latter will sooner or later be entirely ousted by the *plane* mirror. Figure 49, representing the performance of an iridectomy for artificial pupil, shows the scissor-blades parallel with the line of the incision; for a large glaucoma-iridectomy in which the iris-segment must not be removed by a single snip, this is of course the right position; but in all cases where one snip suffices the scissor-blades should, we maintain, lie perpendicularly *across* the incision, as by this means the iris is drawn away from the angles of the wound and never becomes incarcerated—a hint which we owe to the surgeons of the Manchester Eye Hospital and which has proved most useful.

The book is freely illustrated throughout, and capitally printed.

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## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

JULY 3RD, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the chair.

REPORTED BY DAWSON WILLIAMS, M.D.

*Cases of Retro-ocular Neuritis.*—Mr. Nettleship. This paper dealt with cases in which acute inflammation seemed to take place in some small part of the course of the optic nerve. They were characterised by failure of sight in one eye, often accompanied by neuralgic pain in the temple and orbit, and pain on moving the eye. The disc often became more or less atrophic in a few weeks; the result varied from complete

recovery to total blindness. *Illustrative cases:* 1. A lady, aged 34, had an attack of central amblyopia in the right eye, associated with pain in and around the eyeball, and followed by pallor of the disc; she had previously suffered from sciatica, and several of her relations had had gout or arthritis. 2. A man, aged 50, rapidly and completely lost the sight of his right eye; he presented no sign of cerebral disease; there was no evidence of syphilis or gout. Some time previously he had had diplopia from paresis of the right inferior rectus. Except in the most severe cases, the failure of sight was usually at its worst in three days; recovery, when complete, usually required about six weeks. The pain, which was often circumorbital, began before the dimness of vision, and there was a sense of stiffness on moving the eye quickly. Examination of the field usually revealed a central defect; sometimes the field was contracted, at others not. Changes in the disc were by no means constant, even in the worst cases. These cases had to be distinguished from embolism of the central artery, from progressive atrophy where one disc was affected before the other, and from unioocular neuritis due to disease of the corresponding lobe of the brain. The chief difficulty would be to distinguish them from the rare cases where a simple violent papillitis occurred with severe localised pain. In some of the cases the symptoms might be explained by a periostitis of the optic canal; in others, the mischief could not have been so far back; in some, a rheumatic origin seemed probable. The majority of the patients were between 25 and 40. At least five of the twenty-four had had syphilis, and there was a good probability of it in six others. In four cases the affected eye became permanently blind; in eight, more or less damage was done; twelve, exactly half recovered.

The President said that he had seen only one case of this class. The patient was a young lady with a marked arthritic history; one eye only was affected, and became quite blind, without much pain; subsequently there was slight papillitis; the patient ultimately recovered, almost completely; three years later she had a threatening of the same condition in the other eye, but recovered completely. He believed that in this case the loss of vision was due to a gouty inflammation of the optic nerve.

Dr. Stephen Mackenzie inquired as to the condition of the blood ; in leucocythæmia a papillitis was sometimes noticed, which was said to be due to thrombosis of the orbital veins ; diffuse retinitis also occurred in leucocythæmia. The cases described were certainly not seen by the physician, and it was difficult to connect them in a distinct group, in the absence of a clear account of their causation. The suggested connection with the arthritic diathesis was hardly satisfactory, as that diathesis was so common. When the neuritis followed fever, what was the interval between the two ?

Dr. C. E. Fitzgerald mentioned the case of a young lady who had dimness of vision on the left side, slight haziness of the margin of the disc, and pain on movement of the ball. Under treatment, vision was completely recovered. The symptoms recurred in a few months, and later the right eye was affected with intense neuritis, and the patient lost power in the right leg and arm. The nature of this hemiplegia was very obscure, and but for the neuritis would have been considered hysterical. Subsequently the neuritis subsided, and she began to recover ; the vision of the left eye returned almost completely. There was a history of some rheumatic trouble.

Mr. Nettleship replied, that the blood had not been examined, but the patients were not anæmic, nor in a bad state of health. When the condition came on after fever the interval was not great—not more than a few weeks. In one instance the fever was either typhoid or malarial, and the loss of vision came on within a month. He conjectured that the cases were not all of the same nature. In very bad cases there was probably periostitis of the optic canal, in slighter cases neuritis only ; in others, perhaps, small gummat on the optic nerve.

*Central Amblyopia, coincident with peripheral contraction of the fields.*—Mr. Lawford. A lad, aged 18, noticed failure of vision about five weeks after a fall. He also had some general nervous symptoms, for which he was an in-patient at Guy's Hospital. The central scotomata, at first absolute for form, became, as recovery progressed, scotomata for colour only. Eventually, perfect acuity of sight was attained, and the limits of the fields of vision became normal. The other nerve-symptoms also disappeared in the course of six months.

*Sympathetic Ophthalmitis subsequent to the excision of the exciting eye.*—Mr. W. Adams Frost. A man, aged 25, was admitted into Hospital for iritis of the right eye, attributed by the patient to some hair entering the eye while he was clipping a horse a month before. No history of syphilis or rheumatism. Conjunctival and ciliary injection, and on the inner side a few vessels encroaching on the cornea. Lower half of the cornea studded with punctate opacities, and numerous posterior synechiæ. Tension normal. A week later, slight prominence of the ciliary region above; an upward iridectomy performed. The staphyloma increased in size; the eye became very painful and the anterior chamber shallow; iridectomy downwards attempted; but no iris removed. Pain being severe, the eye was enucleated, the left eye being then normal. Five days later, slight conjunctival injection and punctate opacities on the cornea were noticed, but neither pain nor tenderness. Atropine, exclusion of light, and pilocarpine injections were used; a single fine posterior synechia remained. The cornea became clear  $V = \frac{6}{6}$ . The excised eye, examined microscopically by Mr. Jennings Milles (the microscopical sections were shown at the last meeting), showed that the ciliary staphyloma was formed by a nodule consisting of inflammatory cells closely packed. The sclerotic over this was much thinned. The iris was firmly adherent to the lens, and its parenchyma infiltrated with small round cells. The choroid was thickened in its whole extent, especially in the region of the papilla.

Replying to a question by Mr. Nettleship as to the possibility of hairs having penetrated the cornea, Mr. Frost said that there was no mark of any corneal wound, and Mr. Milles had found no particles of hair; but as the case was not seen till a month after the accident, small particles might have escaped notice.

*A Remarkable Case of Proptosis.*—The President narrated the history of a Hindoo gentleman who came to England on account of extreme proptosis of the left eye. The eye was extremely protruded, mostly downwards, the lower lid being everted. Movements of the eye were not much interfered with, but there was a good deal of chemosis. The edge of the lacrymal gland, which was greatly enlarged, was felt on a level with the upper margin of the orbit. The upper lid hung loosely, but the lids could not be closed. The face was puffy, especially



in the parotid region, and under the jaw. The other eye had been attacked in a precisely similar manner about three years previously, and after varying for two years had finally become so prominent, that a few months before he came under observation the lacrymal gland had been removed, as also a firm lobulated mass which occupied the upper and outer part of the orbit, and turned out, on microscopical examination, to be composed of fibro-adipose tissue; suppurative inflammation set in after this operation, and the eye was lost. Within a few days of this time the hitherto healthy eye became protruded. As in the case of the other eye, there had been variations in the degree of proptosis, and looking to the ill effects of operative interference in the other eye, it was decided to try the local application of ice. This was sedulously applied to the eye, to the forehead, and to the nape of the neck, for a week without intermission; the patient at the same time took small doses of iodide of potassium; a decided improvement took place under this treatment; later, mercury was given in combination with the iodide. The result was that the patient was practically cured, and had since remained well. The enlargement of the lacrymal gland was not causal, but merely coincident. Some swelling of the fibrous or fatty contents of the orbit appeared to have caused the protrusion, which was capable of spontaneous diminution, though prone to relapse, and was, as well as the enlargement of the various glandular structures, under the influence of iodide of potassium. Malignant disease could be negatived from the fact that there had been no recurrence in the eye first affected. The disease appeared to be analogous to a group of cases described by Brodie, and more recently by Marrant Baker, where there was a tendency to the formation of ill-defined, but more or less lobulated, masses of fibro-adipose tissue in the region of the neck; but in these cases there was no proptosis or enlargement of the lacrymal gland, though in one there was enlargement of the parotid gland in association with fatty masses in the neck. Though the condition was remarkably local it was not one of new growth, but rather of hypertrophic development, there being no tendency to general obesity. One reason why glands of different function should be associated in the enlargement might be that the hypertrophy was due rather to increase of the connective

tissue elements than of the gland-structure itself. Exophthalmic goitre might possibly be a member of the same family, and he noted that one of his patients, who had these multiple fibro-adipose masses, was excitable to the verge of insanity. In conclusion, he pointed out that these fatty overgrowths underwent great changes in connection with the state of health of the patient, and that much benefit was often derived from change of air. The paper was illustrated by photographs of the patient whose case was detailed, and also of the second case (of multiple fatty masses) referred to.

Dr. Stephen Mackenzie remarked that in Graves' disease there was at first merely a vascular disturbance which led in time to nutritive changes and overgrowth of fatty tissue, and to this the proptosis was, in part at least, to be attributed. Was there any enlargement of the thyroid gland, or alteration in the cardiac rhythm or force in Mr. Hutchinson's case? In Graves' disease, as in the case now under discussion, the continuous application of cold to the neck was of great value, the proptosis, thyroid enlargement, and the dilatation all diminishing.

Mr. George Walker spoke of a case of proptosis following a blow on the eye. By compressing the carotid, the proptosis was diminished, the discomfort decreased, and the circulation in the arteria centralis retinae stopped. Probably an aneurysm at the apex of the petrous portion of the temporal bone had by pressure obstructed both the venous and lymphatic circulation. The carotid was ligatured, and the proptosis almost completely disappeared; he suggested that in Graves' disease simple dilatation of the internal carotid might produce the proptosis by causing similar obstruction.

Mr. Eales related the case of a man, aged 45, in whom an acute attack of headache was followed by proptosis, most marked on the left side; the lacrymal gland was enlarged and pushed forward; the condition was alleviated by treatment, but recurred.

Mr. W. H. Jessop had seen most of Mr. Morratt Baker's cases. He asked whether the second case referred to by Mr. Hutchinson improved under treatment with iodide of potassium.

Mr. Drake-Brockman (of Madras) inquired as to the nationality of the first patient, whether he was a Hindoo or an

Eurasian. Elephantiasis was common among the Eurasians, and not unfrequently was accompanied by proptosis. In these cases, benefit resulted from the use of mercury and iodide of potassium; possibly Mr. Hutchinson's case was of this nature.

The President replied that the patient was of mixed Hindoo and European blood; his case had excited as much interest in India as in England, so that it was probably not of the kind referred to by Mr. Brockman. He had not seen iodide of potassium produce any result in the cases of fatty growths such as Mr. Marrant Baker had described. He did not think that the mechanical theory of the proptosis in Graves' disease advanced by Mr. Walker would bear examination. In Mr. Marrant Baker's cases there was, it was true, a tendency to nervous excitement, the patients exhibiting marked irritability of temper; but the first patient whose case was described presented no such phenomena. Still, he thought the case was very much more nearly related to Mr. Marrant Baker's cases than it was to exophthalmic goitre; there was no enlargement of the thyroid gland, no irritability of temper, nor cardiac disturbance. It might perhaps be found that, with the fatty masses, gland-enlargement in various situations occurred. The dose of iodide was at first small, about three grains three times a day, and never exceeded fifteen grains three times a day. He was inclined to attribute the greater part of the relief, at first to the sedulous use of ice, for it was very marked within forty-eight hours; he was still in doubt as to how much of the recovery could be attributed to the iodide of potassium.

*(The Report of the Annual General Meeting, held on July 4th, will appear in the following number.)*

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## ACUTE GLAUCOMA INDUCED BY ATROPINE, AFTER IRIDECTOMY.

By W. J. CANT, LINCOLN.

Mrs. U—, a thin and nervous woman, 65 years of age, came to see me about three years ago, complaining of severe pain in the head and right eye, frequently preventing sleep and producing sickness.

On examination the eye was found to be quite blind, and its tension greatly increased,  $T+3$ ; two iridectomies had already been performed without relief, and as it was seriously affecting her general health, I advised excision. The operation afforded complete relief; she rapidly improved in health, and she was able to continue her work. Occasionally she had slight pain in the left eye, with rainbow rings round a light, and I ordered a weak solution of eserine (gr.  $\frac{1}{4}$  to an ounce), which quickly relieved her. A few weeks ago I again saw her, when she complained of not being able to see clearly, and on examination I found the lens was becoming opaque, but there were no glaucomatous symptoms. I advised an iridectomy, both as a preliminary to extraction of the cataract and also as an extra precaution against any glaucomatous affection.

A corneo-sclerotic section was made in the upper segment, and a large piece of iris removed; the eye a few days afterwards was quite free from any irritation.

Unfortunately, eleven days after the operation, the patient, by mistake, used some atropine drops which she had had in the house some time, with the result of bringing on an acute glaucoma. I saw her the next day, and found tension increased, the sclerotic injected, and the patient suffering violent pain in the eye and head, with a constant feeling of sickness. Eserine again was ordered, and in a few days all glaucomatous symptoms disappeared.

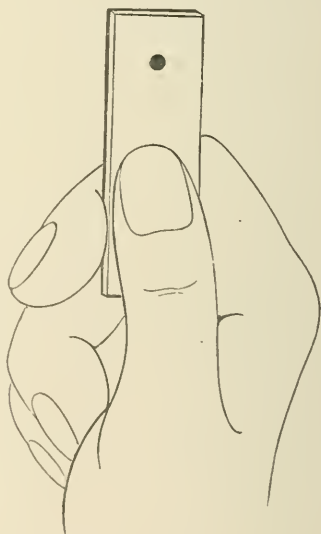
I think the point of interest in the above case is that atropine was capable of producing acute glaucoma in an eye which had undergone the operation of iridectomy, our best protection against the disease.



## A SIMPLE OPHTHALMOSCOPE FOR THE SHADOW-TEST.

By PRIESTLEY SMITH.

For nearly twelve months past I have made daily use of the ophthalmoscope described and figured below, employing it in every case of astigmatism, and in nearly every case of hypermetropia and myopia with which I have had to deal. Whether its advantages will be equally evident to others I cannot tell, but for myself I have no hesitation in saying that, used with the ordinary set of test-lenses, it affords the best means of determining the refraction of the eye with which I am acquainted.



The instrument which I venture so strongly to recommend does not include any costly mechanism, or act upon any novel principle; it is merely the simplest possible form of the plane ophthalmoscope—a piece of ordinary plate-glass mirror, two inches and a quarter long and three-quarters of an inch wide, with the sharp edges rubbed off on a stone, and an aperture

about 2 mm. in diameter scraped in the quicksilver near to one end. Any one who is within reach of a glass warehouse may provide himself with half a dozen such ophthalmoscopes in a few minutes, at the cost of two or three pence. The back of the glass may advantageously be coated with black varnish, but this is not necessary. A case is not required, for the mirror should always lie ready to the hand in the box of test-lenses.

An article on "the advantages of the plane ophthalmoscopic mirror in retinoscopy," by J. B. Story (O.R., Vol. ii, p. 228), first led me to try the method in question, and I at once found that the labour of dealing with refraction cases was much lessened by it. That retinoscopy—the shadow-test—has not yet been universally adopted by those busily engaged in practice may, I think, be partly attributable to the fact that almost all writers on the subject have recommended the use of a concave mirror. The concave mirror of the ordinary ophthalmoscope gives too feeble an illumination of the pupil at any distance greater than about three feet, and even with the special mirrors recommended, the observer must place himself at a given distance from the patient's eye, and must make certain additions to or subtractions from the power of the glass selected in order to arrive at a correct result. With the plane mirror these inconveniences disappear. One can illuminate the pupil at any distance, and it is only necessary to bear in mind that at whatever distance one sits or stands, the glass which gives the absolutely emmetropic appearance is in error by an amount corresponding to that particular distance. Practically it is convenient to make the first trial at about four feet; a single glance from this distance reveals the presence of any refractive error of more than 1.D, and enables one, after a little practice, to say whether it is of low, medium, or high degree, and whether any considerable degree of astigmatism is present. Then having found, by one or two trials, a glass

which brings the refraction near to emmetropia, one tests the accuracy of the correction by retiring to about six feet. The glass, which at this latter distance still gives the slightest possible indication of hypermetropic refraction, may be taken, for all practical purposes, as a true correction. I cannot help thinking that Dr. Story may, with some readers, have damaged his advocacy of the plane mirror by recommending a distance of no less than four and a half metres, a distance at which a steady illumination of the eye is difficult, and which involves a really prohibitory amount of walking to and fro.

At a distance of 5 or 6 feet very low degrees of simple astigmatism reveal themselves at once; when associated with hypermetropia or myopia they become apparent directly the glass which approximately corrects the latter is found. An astigmatism of sufficient amount to call for correction can hardly be overlooked under these circumstances.

When the pupil is widely dilated by atropine, an appearance suggestive at first sight of conical cornea not unfrequently presents itself; a narrow peripheral zone of the cornea transmits a brilliant reflex, while the central area is comparatively dull. Such eyes may, however, be emmetropic and perfectly healthy. The peripheral brilliant zone doubtless corresponds with the slight flattening of the corneal curvature in this region, which is known to be often present in the healthy eye, and which, as the shadow test proves, modifies its refraction in the direction of hypermetropia—normally it has no optical importance, as it lies outside the area of the pupil.

The optical principles of the shadow-test need not be stated here, but for those who have not made use of the plane mirror, it may be useful to repeat the following practical indications:—

*Hypermetropia.*—The shadow moves *with* the mirror; slowly in high degrees, quickly in low degrees.

*Myopia.*—The shadow moves *against* the mirror; slowly in high degrees, quickly in low degrees.

*Emmetropia*.—The movement of the shadow is a transition between the movements of hypermetropia and myopia. It covers the pupil instantaneously; the direction is indistinguishable. Strictly this is true only when the observer is at an infinite distance; at a finite distance, such as six feet, the emmetropic eye shows a trace of the movement proper to hypermetropia.

In the foregoing respects the shadow-test follows the same rules as the older "fundus image test," in which the apparent movement of the retinal vessels is observed during illumination from a distance with lateral movements of the head.

In high degrees of ametropia the reflex from the pupil is dull; it grows brighter as emmetropia is neared. When emmetropia is reached it again becomes dull, for in this condition each ray of light returns precisely to the point from which it started, and the rays which reach the observer through the unsilvered area of the mirror are those only which were previously reflected from the unsilvered area.

The patient should look at the forehead of the observer, or at a more distant object just above his head. The mirror and the correcting lenses must be perfectly bright; the slightest cloud, *e. g.*, of moisture from the eye, obliterates the indications. For absolute determination of the refraction atropine is of course required, but where such absolute determination is not necessary, a mydriatic need only be used when the pupil, as seen in the dark room, is unusually small.

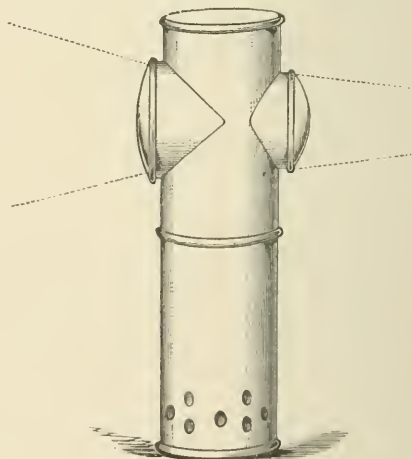
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To the foregoing notes of my own experience I am glad to be able to add the testimony of my friend Mr. Eales. He tells me that he also was led by Dr. Story's article to experiment with a plane mirror of simple form such as the one above described, and that he now deals with very many of his refraction cases in this way, having quite discarded the concave mirror in retinoscopy.

## A PORTABLE CANDLE-LAMP FOR THE OPHTHALMOSCOPE.

BY PRIESTLEY SMITH.

The accompanying figure represents, one third the actual size, a lamp which for some years I have been in the habit of using for bedside work and for all such ophthalmoscopic examinations as cannot be made in the consulting room with the fixed lamp. It is in use in the medical wards of the General and Queen's Hospitals in this town, and it is in the hands of a good many friends ; but as no description of it has hitherto been published a note in this Journal may perhaps be useful.



An inner tube, not seen in the figure, contains a spiral spring and carries a wax candle. The outer tube separates into two parts, the lower holding the candle-tube, the upper carrying two convex lenses of different powers. The stronger, smaller lens transmits the light in a convergent pencil, useful for the oblique or focal illumination of the cornea, iris, and lens. The weaker, larger lens emits a divergent pencil suitable for ophthalmoscopic examinations, direct or indirect. For the direct examination, the lamp should be held in the

observer's disengaged hand, near to the ear of the patient and on the side of the eye under examination.

To light the lamp, and to introduce a fresh candle, the upper half is removed. The candle should not be allowed to burn itself completely out in the socket, or the melted wax will cement the cap firmly to the tube. When this happens the lamp should be cleaned by immersion in hot water.

The makers are Messrs. Bailey, Opticians, Bennett's Hill, Birmingham.

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A. NIEDEN (Bochum). Affection of the Sympathetic Nerve in the Region of the Eye. *Centralbl. f. prakt. Augenh.*, June, 1884, p. 153.

A man, aged 51, was exposed during a six days' sea voyage to intense sun heat and very frequently to the direct heat of the furnace fires as well. This caused constant profuse sweating and general dilatation of the superficial capillaries, but no feeling of disorder, until, for coolness sake, at the end of the voyage he plunged into a cold river bath. Immediately the heated face came in contact with the cold water he felt a shock in the right side of the head, followed by a dull bruised sensation. This persisted, and he noticed on leaving the water that the skin of the affected region had partly lost its sensitiveness to touch, and that it appeared paler than the corresponding area of the left side. He felt no giddiness. During the next day or two the uncomfortable feeling in the skin of the right side of the head increased; the pressure of the hat caused discomfort; it was noticed that the right lid-aperture and the right pupil had become smaller than the left, and that when heated the right half of the forehead did not sweat. In other respects the patient continued to feel well.

Nieden saw the case on the thirtieth day. The right lid aperture measured ordinarily 6 mm., the left 9.5 mm., the patient's utmost effort extended them to 8.5 and 11 mm. respectively. There was no paralysis either of the levator of the lid or of any muscle; all the ocular movements were normal; there had been no diplopia.



The larger conjunctival vessels were slightly injected, but there was no marked pericorneal injection. The cornea was healthy. In ordinary daylight the right pupil measured 2 mm., the left 4.5 mm., the former being less prompt in reacting to light than the latter. Galvanisation of the cervical sympathetic did not affect the pupil, but a strong current, applied with the anode to the forehead, and the cathode to the mastoid process, induced, on several occasions, a gradual dilatation of the myotic pupil to the same size as its fellow. Electrical stimulation of the muscles excited a prompt reaction, and for a short time equalised the lid-apertures.

The choroidal and retinal vessels of the right eye appeared overfull, the disc diffusely reddened. Venous pulsation was not discoverable. Both eyes were emmetropic with  $V = 1$ . The tension of the affected eye was not noticeably raised or lowered. The patient complained of a sensation as though the eye were drawn backwards in the orbit, and on accurate measurement a slight enophthalmos was actually discovered, the right cornea being about 1.5 mm. behind the left. Strong rotation of the eye inwards or outwards increased this feeling, and was avoided by the patient.

The only visible difference in the skin of the two sides was that on the right side it remained dry even when it perspired freely on the other. The affected area extended inwards exactly to the middle line, upwards about three fingers breadth beyond the hair margin, and downwards was limited by a line passing from the external canthus over the zygoma to the helix of the ear. A difference of temperature on the two sides was not positively determined. The skin of the area above defined appeared somewhat hyperesthetic.

By means of a Dudgeon's sphygmograph applied over the temporal artery on each side, Niden obtained positive evidence of loss of vascular tonicity on the right side. The pulse wave, as shown in the published tracing, is such as would occur in an elastic vessel dilated through loss of its nerve control, and consequently yielding too readily to the heart's impulse. The heart's action and sounds were normal, and the radial pulse examined with the sphygmograph was exactly alike on the two sides.

From the fact that the affected area was said to have been pale immediately after the shock, Nieden supposes that the immediate effect of the cold water upon the heated surface was a violent spasm of the vasomotor nerves, followed later by a paralysis. Then followed lid and pupil contraction, anhydrosis, enophthalmos, in the order named, as is usual in such cases. The seat of the mischief was probably in some part of the plexus surrounding the external carotid artery; a deeper position was excluded by the absence of the slowing of the heart and wasting of the one side of the face usually associated with lesion of the cervical sympathetic.

Systematic galvanisation of the cervical sympathetic for six weeks produced no marked improvement. Local and general diaphoresis, by steaming, and pilocarpine, were also without decided result. The affected area very gradually lost its unpleasant sensations, and recovered to some extent the power of sweating, but even nine months after the event a difference between the lid-apertures and pupils still existed, and the sphygmograph still revealed a want of tone in the temporal artery.

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E. WALTER (Lönnigen). Clinical Studies on Detachment of the Retina. Dissertation under the Direction of Prof. Horner. Zurich, 1884. (*Abstracted by Emmert in "Centralbl. f. prakt. Augenh.," June, 1884, p. 191.*)

The author classifies 300 cases of retinal detachment which came under observation in the private practice and the clinic of Prof. Horner during the twelve years 1872 to 1883. Cases in which the detachment was found only by dissection, those in which it was due to intraocular tumour, and those in which ophthalmoscopic examination was impossible, were excluded.

The intraocular pressure was lowered in the great majority of cases, seldom normal, increased in only three cases. The vitreous was cloudy in 141 cases, *i.e.*, nearly fifty per cent.; in sixty-eight of these there was myopia. The detachment lay below in ninety-two, on the inner side in only two, in the region of the macula in six. In fifty-two cases the detachment occurred suddenly; in forty-one within periods of a few hours;

in fifty-seven gradually; in 150 the mode of onset was not to be ascertained.

The following table shows the relative frequency at various ages :—

Ages	1 to 10 years.....	1 case
10 "	20 " .....	24 cases
20 "	30 " .....	48 "
30 "	40 " .....	29 "
40 "	50 " .....	44 "
50 "	60 " .....	84 "
60 "	70 " .....	54 "
70 "	80 " .....	16 "

Classified according to the refraction there were :—

Myopia .....	156 cases
Hypermetropia .....	53 "
Emmetropia .....	38 "

Classified according to their etiology the 300 cases stand as follows :—

Myopia .....	144 cases = 48 per cent.
Injury .....	49 " = 16·3 "
Iritis, irido-cyclitis, irido-choroiditis	11 " = 3·6 "
Choroiditis .....	10 " = 3·3 "
Hemorrhagic diathesis .....	23 " = 7·6 "
Congenital anomaly of the eye ...	2 " = 0·6 "
Simple congestive conditions.....	11 " = 3·6 "
Vitreous cloudiness only .....	22 " = 7·2 "
Purely idiopathic detachments ...	28 " = 9·3 "

These results are illustrated by curves, which indicate in a striking manner that the liability to detachment of the retina culminates at two separate life-periods—namely, at about the ages of 30 and 60. The earlier culmination-point is due to the traumatic cases; the later one depends chiefly on the myopic and the so-called idiopathic cases. It is significant that the majority of the myopic detachments occur at the age when the progressive enlargement of the globe meets with an increased resistance, the lamina cribrosa becoming involved in the ectasia, and the senile changes in the retinal vessels hindering their further elongation. It is at this same period of life that hæmorrhages at the macula and inflammatory processes in the same region often occur. Hæmorrhages appear, on the whole, to play an important part in the causation of detachment of the retina. (For statistics by Galezowski bearing on this subject *Vide* O. R. May, 1884, p. 151.)

H. ARMAIGNAC. Spontaneous Cure of Old Detachment of the Retina. *Revue Clinique d'Oculistique*, Feb. 1884, p. 28.

A man, aged 62, consulted Dr. Armaignac in 1880, complaining of a sudden loss of sight in his left eye eight days previously. The tension and the reaction of the pupil were normal, the vitreous healthy, and the optic disc of a good colour and with no appearance of posterior staphyloma around it. The whole upper and inner portion of the retina was completely detached, and the field of vision was so much impaired that fingers were distinguishable only in its external and superior parts. The right eye was healthy except for slight opalescence of the lens, and a myopia of  $2.25D$   $V = \frac{5}{9}$ . The patient rejected all methods of treatment, both those proposed by Armaignac and those advised by other oculists whom he consulted in Paris, and ten months later the condition of the eyes was unaltered.

Seventeen months after the commencement of the attack the eye showed signs of having undergone a slight attack of iritis, for a tag of synechia was observed at the lower edge of the pupil, and a small patch of exudation upon the anterior lens capsule. No notes were taken as to the state of the retina at this visit.

Some two years later the patient presented himself to state that while again in Paris he had consulted several oculists, who had informed him that no detachment existed at all, but that he had a cataract in process of development. Dr. Armaignac forthwith dilated the pupil with atropine, and ascertained that this was in fact true; the disc was white, the vessels contracted, and the lens beginning to show streaks of opacity in its tissue, but the detached retina had replaced itself, and presented no trace of pigmentation or of abnormal colour. As on the last visit, perception of light was the only power of vision present.

Dr. Armaignac concludes by stating that had not his original diagnosis been confirmed by the opinions of several oculists of unquestionable capacity he would not have published the case, as he would have been unable to exclude the idea of his having made an erroneous diagnosis.

LA GRANGE (Bordeaux). Rupture of the Nasal Nerve in Cases of Ciliary and Trigeminal Neuralgia. *Arch. d'Ophth.*, July-Aug, 1884, p. 325.

In most of the cases hitherto put on record this operation has had for its object the relief of glaucoma. Its efficacy in removing the pain of glaucoma is, the author declares, established beyond all question; it is in this way, he thinks, rather than by any definite influence on the excess of tension, that it has proved serviceable. Hence it appeared likely, *a priori*, that the operation would be especially useful in cases of ciliary neuralgia not connected with glaucoma. The object of the present paper is to show that in the clinique of Dr. Badal this has been proved to be true.

By ciliary pain is to be understood pain which originates in disease of the eyeball. In six cases in which the disease was chiefly of the nature of an irido-cyclitis, rupture of the nasal nerve had a marked effect. In four of these the eye was already completely blind; the operation relieved the pain, and so avoided the necessity for excision. (When, as in two of the cases here recorded, loss of vision and irido-cyclitis have been caused by perforating injuries, is it justifiable to subdue the pain merely?)

In four other cases the immediate result of the operation was a diminution or cessation of the pain, but the relief was only temporary.

Four cases are added in which the same proceeding was employed for the relief of other forms of neuralgia of the trigeminus. The results were indefinite and incomplete, but the author urges that when nerve-stretching or rupturing is resorted to in these conditions, the nasal nerve should be selected by preference, on the grounds, firstly, that the operation is very easy and simple, causing little pain, and rapidly followed by healing; and secondly, that the area of the anesthesia which results is less formidable than after rupture of either of the other branches, the infra-orbital especially.

The author summarises his opinions as follows:—

1. Rupture of the nasal nerve is very efficacious against ciliary pain.

2. Success may be relied on when the operation is directed to pain and not to loss of sight.
3. The results may be explained by the relation of this nerve to the lenticular ganglion, which supplies sensitive nerves to the eyeball.
4. They may be produced either in a reflex manner, or by an actual solution of continuity between the trunk of the nerve and the sensitive root of the ganglion.

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**W. A. McKEOWN (Belfast).** The Treatment of Immature Cataract. *Brit. Med. Jour.*, August 2, p. 238.

In his Presidential Address to the Ophthalmic Section of the B.M.A., at Belfast, Dr. McKeown recommended a novel procedure, lately practised by himself, for the maturing and complete removal of cataract and incidentally for some other purposes, namely, the intracapsular and intraocular injection of water heated to the temperature of the body. "I hope," he said, "that ere long the experience of my brethren will enable them to share with me the opinion that all lenses, whether cataractous or not, and, if cataractous, whether wholly or partially so, may be extracted with as much success as the most mature cataract may be at present." He described the methods of injection as follows :—"1.—The introduction within the capsule of a needle attached to an ordinary hypodermic syringe. If there be any part of the lens-substance easily disturbed, the injection usually ruptures the capsule a little at the point of puncture, and washes out a good deal of cortex. It is certain that it clears out masses quite easily which could not readily be removed, even by a scoop. This mode of injection is perfectly safe. 2.—After removal of the nucleus, the introduction of water inside the capsule by gravitation from a bottle fitted with a tube. 3.—The introduction of a similar terminal to that attached to the bottle, but fixed to the syringe. The latter two methods require a good deal of care, and involve the question of the force allowable, and the time during which the flow of water and the syringing can be safely continued."



Dr. McKeown promises to publish, before long, full details of the procedure, and of all the cases in which he has employed it; meantime he summarises his three months' experience of its efficacy in these words:—"It shortens operations, it puts aside scoops, spoons, and curettes, does away largely with the tedious process of friction through the lids to remove cortex, and enables me to undertake operations of which previously I should not have dreamt."

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**J. R. WOLFE (Glasgow). Clinical Demonstrations on Ophthalmic Subjects. London: Churchill, 1884.**

This is a reprint of four articles published in the *Practitioner* and *British Medical Journal*, during the years 1882, 1883, and 1884. The subjects are: Transplantation of conjunctiva from the rabbit to the human subject, Transplantation of skin-flap from distant parts without pedicle, Operation for the cure of detachment of the retina, Tubercle of the iris and ciliary body. Illustrative cases, with photographs of the patients, are given. We reprint the passages which describe Dr. Wolfe's modes of operating.

*Transplantation of Conjunctiva from Rabbit.*—"The patient is put under chloroform, and also, at the same time, two rabbits; one being kept in reserve in case of accident. . . . I find the grey wild rabbit more suitable than either the white or black; the conjunctiva in it is tougher and stronger and stands handling better. . . . I then separate the adhesions, so that the eyeballs can move in every direction. I then, if necessary, enlarge the external palpebral opening of the rabbit so as to enable me to evert the lid better for dissection. Ligatures are then introduced into the conjunctiva of the rabbit to mark the extent of the membrane to be removed; by means of the ligatures it is put on the stretch and dissected with strabismus scissors. The membrane is spread out on the back of my hand and left to dry there while I finish the preparation of the part for its reception. The flap is cleaned and trimmed, after which it is slightly moistened and then removed to its new site. It is now at once stitched to the free border of the lid, which is at the same time strongly everted, spread out

carefully, and secured at the *cul-de-sac*. I generally find eight ligatures sufficient to keep the transplanted membrane in its place. The ligatures are left in for four or five days before they are removed.

“During the last eleven years I have operated in thirty-five cases by this method, and my own experience is that the operation proves highly satisfactory, considering the hopeless character of the cases . . . . I attach great importance to putting the flap down in such a way that there is no curling up or twisting, and so that no mistake can be made as to which is the epithelial surface. Unless this is strictly attended to, success cannot be expected.”

In November, 1883, Wolfe re-examined a case operated on eleven years previously, and found “the conjunctival sac still as perfect as it was eleven years ago.”

*Transplantation of Skin-Flaps*.—If we wish a skin-flap to adhere to a new surface by first intention or agglutination, we must be sure that it is free of all areolar tissue, and properly fixed in its new place.

The shape and size of skin required must be carefully cut out in lint. The piece of lint is then laid on the fore-arm, which is in a state of semi-supination, and the shape traced by the point of a knife, making it larger all round to allow for shrinking.

I find the most satisfactory way of removing the sub-cutaneous tissue is to snip it off with sharp scissors from the flap spread out on the left fore-finger, then dip the flap in tepid water, and dry it properly. After the flap has been prepared, it is put on its new site and moulded into position. I prefer not to use sutures for keeping it in place, as the very finest threads sometimes give rise to exudation of pus when the ligature is withdrawn. The best method, if practicable, is to dissect the neighbouring part all round, and push the edges of the flap under it. After the flap has thus been properly moulded into its new site, lint soaked in hot water is held upon it for five or ten minutes, and then a few other pieces of lint wrung out of hot water are laid upon the new flap, and the whole covered and secured by an immovable bandage. The application of carbolic acid, or any other irritant substance,

should be avoided as prejudicial, inasmuch as it is apt to remove the cuticle. The head should be kept steady and warm. The patient is kept in bed, well covered, and supplied with warm drinks to keep up the temperature of the body. The eye should not be disturbed for the first three days after the operation, after which the dressing should be carefully removed, the last ply of lint being properly soaked with hot water, that it may be removed easily without any dragging or derangement of the flap. It may then be dressed every twenty-four hours thereafter. The plan of covering it only with gold-beater's skin is actually exposing it to a chill when moisture and warmth are requisite. I would recommend also the exercise of patience in the severance of the lids. This should not be attempted for the first six weeks, and even then only done partially at first, as the too early separation of the lids is not advantageous.

*Operation for detachment of the retina.*—"Before resorting to operative interference we must ascertain (1) that there is no opacity or softening of the vitreous, or at any rate, if present, that it is not general but is confined to the region of the detachment. (2) That the retina is healthy. (3) That the effusion is purely serous. We must then determine the exact site of the detachment, so that the lance enters the pendant portion of the retinal bulging. The patient being put under chloroform and the speculum introduced, the assistant fixes the eyeball with forceps. A vertical slit is made with scissors into the conjunctiva and sub-conjunctival tissue, laying bare the sclerotic at a point corresponding to the site of the detachment, which is generally below the equator at its anterior aspect. The lips of the wound are separated by two small strabismus hooks, and the assistant steadily maintains the position of the eyeball to prevent the exposed portion of the sclerotic from shifting. The sclerotome is introduced into the sac formed by the fluid. The incision through the sclerotic is made obliquely in such a manner that the edges of the scleral wound should overlap each other and not remain gaping when the instrument is withdrawn. Gentle pressure is made upon the eyeball in the track of the receding lance by means of a fine spatula. The lips of the external wound are brought together with a fine silk ligature or two, and both eyes

are strapped with court plaister. The patient is kept in bed in a dark room for three days. The plaister and ligatures are removed on the sixth day, and the eye is gradually accustomed to light. On the eighth day the result of the operation may be tested."

The author gives particulars of six successful cases.

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## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

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ANNUAL GENERAL MEETING,  
JULY 4TH, 1884.

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JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

The Annual Reports of the Council and Treasurer were presented, Officers were elected for the ensuing session, and certain changes in and additions to the rules were made.

*Sympathetic Neuro-retinitis*.—Dr. W. A. Brailey showed a patient who stated that, on March 6th, her left eye was cut by a broken jug. Before this, there had been no symptoms of disease, either local or general. The wound passed in the antero-posterior direction through the ciliary region. Two weeks later she had pain in the right eye, and the sight began to fail. She first applied at Guy's Hospital three weeks after the accident. Vision was then very imperfect ( $\frac{6}{60}$ ); the optic disc was a little swollen; the margins blurred; the vessels pale, rather contracted, and in some cases edged with faint white streaks for a short distance into the retina. The vessels near the yellow spot were rather larger and more numerous than usual, and also somewhat tortuous. Vision had gradually improved up to  $\frac{6}{24}$ , but the optic disc had grown flatter and paler. The exciting eye (left) had caused no pain since the first week. He thought the case was an instance of a neuritis of the anterior part of the optic nerve, produced sympathetically.

The President observed that the case was probably the first well authenticated instance of a sympathetic optic neuritis.

Mr. Adams Frost referred to a case of optic neuritis occurring in the course of a sympathetic ophthalmia, where the inflammation of the media was very trifling.

*Miners' Nystagmus.*—Mr. Simeon Snell advocated the opinion, as the result of clinical experience, that the cause of this disease lies in the peculiar position in which the miner performs his work. He had seen no evidence to support the theory of central disease, and believed the poor illumination of the safety-lamp, and other causes mentioned by writers, were insufficient to account for the affection. He described the various classes of men engaged in a coal pit, and the kind of work performed by them. The disease appeared to be confined to the "coal getters." Men suffering from this affection had usually been engaged in work which necessitated their lying on their sides, some of the "coal getters" being employed in this manner in what was termed "holing," *i.e.*, driving a cutting under a seam of coal. The hole might reach a yard or more underneath the coal, and might be only 18 inches to 2 feet high; a man working in this would be cramped up and lying on his side. Long experience together with actual observation of the men at their work had corroborated this opinion, which he had expressed nine years ago. Further evidence in support of this view was educed from cases mentioned by Oglesby (*Trans. Ophth. Soc.*, vol. ii.), and also the statement of Dransart (*Annales d'Oculist.*, 1877), that all the sufferers had worked in shallow inclined bearings. Mr. C. S. Kilham had, at Mr. Snell's request, examined over 500 colliers in Durham, and found not a single instance of nystagmus; in none of these pits were the men occupied in work compelling their lying on the side. Dransart supposed the disease to be due to fatigue induced in the elevator muscles, by the frequent upward gaze of the miners at work. Mr. Snell explained that working in the manner mentioned, the eyes were frequently thrown into an oblique position upward to the left or right—a position much more fatiguing than simply looking upwards. The muscles affected would be the superior rectus, the inferior oblique, left internal rectus, and right external rectus, in looking to the right, substituting the right internal and left external rectus in looking to the left. He considered the nystagmus to be analogous to conditions of "chronic fatigue" in other regions, *e.g.*, writer's cramp. Recovery took place if the patient ceased work in the pit in a variable time; it was possible that changing the manner of work would be sufficient. Strychnia and other remedies appeared to be useful as adjuvants.

The President said that Mr. Oglesby's paper had conveyed to him the impression that the constrained attitude was an important factor in the production of the nystagmus, but that the long hours of work and the bad light added to the influence of the muscular fatigue; clearly writer's cramp was the malady most analogous to the nystagmus; but it was easy to imagine, in both cases, that there was a lowering of central activity, so that the disease was not purely local.

Mr. Priestley Smith urged that in searching for the causes of nystagmus in miners, the analogies with other forms of nystagmus should be taken into account. The movements in all forms of nystagmus were synchronous and symmetrical in the two eyes, proving, he thought, that the disturbance of function lay not in this or that muscle but in the centres which issue bilateral impulses to the co-ordinated groups of muscles, the disturbance being probably due to failure of nutrition. The nutrition of the centres appeared to depend, to a great extent, upon the stimulus afforded by retinal impressions. Children born with opaque lenses or other impediments to the reception of good retinal impressions become nystagmic; if sight is improved early by operation the nystagmus disappears, but if operation be long delayed it remains persistent throughout life, apparently because of the absence of the necessary stimuli to the centres during their early growth. The condition of the miner appeared to be analogous; he worked between "black walls," with very feeble light, conditions offering little stimulus to accurate fixation. The strained position of the eyes, so well made out by Mr. Snell, would be a strong auxiliary cause: given a reduction of energy in the brain centres for ocular movements, the signs of exhaustion would be most readily evoked in cases where special effort was demanded.

In reply to a question by Mr. Nettleship as to how cases of monocular nystagmus could be reconciled with the idea of central loss of function, the speaker pointed out that in speaking of a centre for any bilateral movement we probably mean two centres, one in each half of the brain, connected by commissural fibres and habitually acting together, and that in the very rare cases of monocular nystagmus one half of the compound centre was probably atrophied, the other healthy.



Dr. Brailey said that the nystagmus was, in his opinion, certainly due to fatigue in the muscles. If the eyes be placed in the strained position indicated, a sense of fatigue soon becomes appreciable, and nystagmus even may occur.

Mr. Eales held similar views to those expressed by Mr. Priestley Smith. Without denying that strained position and consequent fatigue were important factors, he attributed much more importance than Mr. Snell did to the visual conditions under which the miner worked—the blackness of the object looked at and the feeble light. Nystagmus, except in some rare cases of central nerve disease, was always associated with faulty vision and consequent imperfect power of fixation. In miners there was probably some loss of retinal sensibility, for night blindness was frequent; the light sense should be measured in such cases. He mentioned the case of a man who for 20 years had worked by naked lights without any nystagmus, but in whom the condition began soon after using the safety lamp. He considered miners' nystagmus to be due to absence of sufficient stimulus to fixation, and consequent strain and exhaustion of the co-ordinating centres. This view was supported by the facts that the movements are always conjugate; that other kinds of miners do not get nystagmus; that other occupations involving great strain on the muscles cause other troubles, *e.g.*, insufficiency, but not nystagmus.

Dr. Stephen Mackenzie observed that it was impossible to separate muscular fatigue from fatigue of nerve-centres. It seemed probable that the nystagmus was due to exhaustion of the nerve-centre; in exhaustion from any cause tremor was apt to occur. In the miners, he would be inclined to attribute much importance to the imperfect light.

Mr. W. Adams Frost had formerly lived for two years in the colliery district of North Staffordshire, where miners' nystagmus was common. The Davy lamp was in use there, and "holing" practised. The photographs which had been handed round depicted the miners' position in this operation very accurately. He thought it extremely probable that in the mines in which the Davy lamps were not used, "holing" was not common; in the operation of "holing" it was not necessary to fix very accurately, and, indeed, as the hole was often a yard deep, it was not possible.

Mr. C. E. Beever observed that muscular fatigue alone did not seem capable of producing tremor ; for instance, the fatigue of muscles by the faradic current does not produce it.

Mr. McHardy suggested that in the analogous malady, writers' cramp, there was some interference with nervous conductivity.

Mr. Snell in reply said that the condition was not symmetrical ; if the imperfect light and the black walls were the efficient causes, why was not the disease more widely diffused ? The light by which the holers worked was not materially worse than that used by other workers in the coal-pits, yet nystagmus was entirely confined to the holers.

*Model for Demonstrating Operations on the Eye.*—Mr. Streatfeild exhibited and explained a large model eye, made for him by Hawksley, of Oxford Street, on a scale exactly ten times that of the actual eye ; also models of eye instruments on the same scale. The apparatus had a half motion of rotation in every direction, and the front hemisphere of the eye could be fixed in any desired position ; the sclerotic and the eyelids were made of white felt ; the cornea of stout glass of the right curvature ; the iris was imitated in thin sheet india-rubber, with a round hole for the pupil. The lens (cataractous) was made of zylonite. The internal and external rectus muscles were represented by pieces of linen bandage. With this apparatus could be represented the *modus operandi* of peripheral section of the cornea, of iridectomy, of extraction of cataract, and of squint operations. At any part of the upper half-circumference of the cornea, the knife, forceps, pricker or curette could be entered between the felt sclerotic and the glass cornea, which gave way for their admission, and resumed the natural position when the instrument was withdrawn. The india-rubber iris could be seized with the iris forceps at any part, drawn out of the eye, and so much cut off as might be desired. With this large apparatus, operations and other matters ordinarily quite invisible to a large class of students could be satisfactorily demonstrated. Mr. Streatfeild performed a cataract extraction on his model.

*Cases of Congenital Defects.*—Mr. Simeon Snell related the following cases of imperfect development :—

1.—Congenital cysts in the lower eyelids with (apparent) anophthalmos. Patient an infant of a few weeks ; in left lower eyelid a large cyst, with bluish tint, extending deeply into the orbit. On being tapped, straw-coloured fluid escaped, resembling on analysis that from similar cases recorded as “congenital cysts with anophthalmos.” Subsequently, the cyst-wall was partially excised, and it was thought a rudimentary globe was detected at the back of the orbit. In the right lower eyelid, at first, there seemed to be a very small cyst ; it was not tapped, and a year later it was hardly apparent. Here also a resistance, particularly at the later period, was detected in the orbit, and was thought to indicate the presence of a rudimentary globe. Both orbits were normally developed, and completely lined with conjunctiva.

2.—Congenital cyst in lower eyelid with microphthalmos, in an infant under the care of Mr. W. M. Jones, of Wath. The cyst filled the orbit. After dissecting it out, a microphthalmic eye came into view. The cornea was well formed, there was a coloboma at the lower part of the iris, and the eye was possessed apparently of some vision. An ophthalmoscopic examination was made ; as far as could be made out (the child was almost moribund with tubercular peritonitis), the coloboma extended into the choroid, but did not reach to the optic disc. The cyst in the eyelid presented a bluish tint ; the fluid was straw-coloured. The theory that such cysts arise from the encysting of a staphylomatous coloboma corresponded well with their association with microphthalmic or rudimentary globes.

3.—A case of absence of eyeball on one side.

4.—Microphthalmos of the left eye, with coloboma of the optic nerve-sheath and coloboma of the choroid in the right eye. The fundus in the left eye displayed the rare condition described as coloboma of the optic nerve-sheath ; the coloboma was six or eight times the size of the optic nerve, perhaps being the largest recorded ; on the left side fingers could be seen, possibly more ; on the right,  $V = \frac{1}{5} \frac{0}{0}$ . Between the optic disc and the periphery below, a pearly white patch

was situated ; the edges were well marked, and pigmented, otherwise the fundus was normal. This was considered to be congenital, and to be due to arrest of development (coloboma of the choroid). In neither eye was there a cleft of the iris, nor any deformity beyond those named. Nystagmus, affecting both eyes, was present.

5.—Remains of hyaloid artery. The attachment to a vessel in the centre of the optic disc was clearly made out ; at this point it was a little more funnel-shaped. Anteriorly, it was attached to the posterior lens-capsule, where it occasioned a striated opacity. Fingers could be seen at one foot. The eyes were myopic.

6.—Coloboma of upper eyelid, situated at the junction of the inner with the middle third. There was also a lipoma of the conjunctiva.

*On a Preliminary Precaution in Cases of Cataract complicated with Lachrymal Obstruction or Catarrh.*—Mr. Streatfeild read a paper dealing with cases of cataract complicated by lachrymal obstruction, or catarrh. Extraction in such cases involved almost certain failure. When suppuration followed purulent infiltration of the corneal wound, as the direct consequence of the extraction, it was commonly the beginning of suppuration of the whole eye. Absolute loss of an eye after cataract extraction was a rare event ; as a rule it resulted from suppuration. Of the last six absolute losses after extraction at Moorfields, three were the results of suppuration. He had had two such cases within the past year—one in private practice, and the other at Moorfields. The cause of this suppuration, he was inclined to think, was generally some lachrymal obstruction, and secretion of purulent matter from the tear passages. The state of the lachrymal mucous membrane was difficult to investigate, and it was liable to be considered to be in a healthy state when it was not so. An inconspicuous quantity of pus would be sufficient to infect the corneal section. For the prevention of such disasters Mr. Streatfeild advocated a preliminary obliteration of the sac with destruction of the whole of the lachrymal mucous surfaces.

J. L., a thin and healthy countryman, aged 68, was admitted into Moorfields Hospital, July 4th, 1883, with mature cataracts, both lower lachrymal puncta somewhat everted, and an overflow of the tears in either eye. The lower canaliculi were slit. Pus was found on the lachrymal sac on each side. The ducts were probed nearly every day, for ten days, and cure seemed to be complete. On July 16th, the left cataract was extracted. On the day after the extraction, a purulent infiltration of the wound began, and the eye was soon lost; on July 23rd it was excised. The patient left the hospital on August 2nd. On November 24th, he was readmitted with lachrymation of the right eye, but no evidence of pus in the sac. The lower canaliculus, which had been slit, was patent; there was no difficulty in passing large probes, but recovery was not complete. On December 10th, the upper canaliculus of the right eye was slit, from the puncture to the lachrymal sac; when the bleeding had stopped, the eyelids were held widely apart, the eye itself being covered and protected, and the pointed end of Paquelin's thermo-cautery was passed rapidly in the direction of first one and then the other canaliculus, along them, and quite into the sac. A skin-incision was then made over the lachrymal sac, rather longer than the whole of its extent, downwards and a little outwards, between the root of the nose and the lower eyelid; this was then continued into the mucous cavity itself; when the bleeding was arrested, the two edges of the deep incision were laid widely apart, and the broader end of the cautery was very freely and repeatedly applied to all parts of the exposed mucous surface, from the top to the bottom of the sac. The cavity was stuffed with carbolic oiled lint. On January 1st, the wound had healed, and the sac and the canaliculi were apparently obliterated. There was slight lachrymation, but there was no pus, or any muco-purulent matter in the eye. On April 23rd, he was again admitted. There was then a depressed scar in the place of the lachrymal sac, and a small hole leading down in that direction; there was also an indication of a part of the lower canaliculus. The following day, the cautery was again applied to the fistulous orifice and to the remains of the lower canaliculus, and on May 8th for a third time. On May 20th there seemed to be no trace of the canaliculi remaining, and no

indication left of a lachrymal sac. There was now no discharge upon the conjunctival surface at any time; the flow of tears was slight, and no longer troublesome. On June 2nd, the cataract of the right eye was extracted. The eyelids were washed with a 1 in 40 solution of carbolic acid before the operation, and boracic acid ointment (ten grains to one ounce of vaseline) was smeared on the dressing. A weak solution of boracic acid was used subsequently, every day, to bathe the eye, and the same ointment was reapplied with the after-dressings. Slight ciliary congestion with photophobia occurred about a fortnight after the operation, but he made a good recovery. The objections to the obliteration of the lachrymal sac were not practically very strong, and, in cases now under notice, it seemed to be absolutely necessary in order to avoid failure after extraction of the cataract.

*Cystic Tumour of Iris.*—Mr. W. J. Cant. The patient, a man, aged 40, had been injured in the right eye when a boy by a piece of steel; apparently it completely recovered. About three years ago he noticed something growing over the sight. On examination, a cystic tumour was seen almost filling up the pupil, growing from the iris at the upper segment.  $V = \frac{5}{24}$ , and he read J 16 with difficulty. A fundus-reflex could be obtained through the tumour. The tension of the eye-ball was increased (Tn + 1 or 2). His left eye was almost useless from opacity of the cornea. The tumour, together with a piece of iris, was removed through an upper section, and afterwards an iridectomy downwards was made. The eye completely recovered with good vision,  $V = \frac{5}{19}$  and J. 2.

*Injury of Head, followed by temporary Blindness and Anosmia.*—Mr. Spencer Watson. A potman threw himself out of a window a height of forty feet, and was taken up in an unconscious state. He regained partial consciousness, and then became violently delirious. After the swelling of the eyelids had passed off, he was found to be absolutely blind, and ophthalmoscopic examination revealed engorged optic discs. Loss of smell was also noticed at this time. In a few days the sight improved, and at the end of six weeks was quite restored. The anosmia remained. The probable cause was a hæmorrhage in the middle and anterior fossæ.



*Living and Card Specimens.*—Mr. Snell. Section of a bony tumour of the conjunctiva from the right eye of a girl aged 13; probably existing since birth, but causing no inconvenience until shortly before she came under observation.

Dr. Walter Edmunds. Ophthalmoscopic drawing from a case of cerebral Tumour presenting appearances like those of albuminuric retinitis. Well marked double optic neuritis with hæmorrhages round the disc; also bright radiating lines at the yellow spot. Retinal veins not tortuous.

Mr. Lang. A child with a growth on the iris, possibly tubercular. When first seen a month ago there were several growths on the lower part of the iris, and the cornea was hazy; the growths had since steadily increased in size, and there was pus in the anterior chamber.

Mr. A. Critchett. A patient with conical cornea operated on.

The same with Mr. Juler. A case of squint cured by operation, and a leucoma of cornea treated by tattooing, and formation of an artificial pupil.

Mr. Adams Frost. Two cases of double optic neuritis in children.

Mr. Nettleship. Examination of a Glaucomatous Eye, in which retinal hæmorrhages were present, and distributed in a manner suggestive of obstruction to the descending branches of the central retinal vessels.

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## A CASE OF FATAL MENINGITIS OCCURRING AFTER ENUCLEATION OF A SHRUNKEN EYEBALL.\*

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Considering the intimate connection that exists between the sheaths of the optic nerve and the meninges of the brain, and the anatomical and physiological proximity of the orbit to the cranial cavity, it must be a matter of surprise to those who reflect how seldom untoward results occur after the operation of enucleation of the eye. The wonder is, not that meningitis does now and then occur in this connection, but that it is not a matter of everyday experience.

So free, however, is the operation usually from danger, that of the thousands of eyes enucleated each year it is only at long intervals that a case of consequent meningitis is met with.

The following case occurred recently in my practice at St. Mark's Ophthalmic Hospital, and I think it advisable that the main facts should be placed on record for future reference :—

CASE.—J. P., a girl, aged 17, was admitted into St. Mark's Ophthalmic Hospital under my care on the 11th of February, 1884, having been sent up for operation by Dr. Stoney, of Abbeyleix.

*History.*—The left eye had been affected after an attack of scarlatina eight years before, and had become staphylomatous, and remained totally blind ever since.

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\* Read in the Pathological Section of the Academy of Medicine in Ireland, February 29, 1884.

Three weeks before her admission she got a severe pain in this old blind eye, which became swollen, and four days afterwards it "burst," and she got relief. No doubt this history points to suppurative panophthalmitis.

*Condition on admission.*—The conjunctiva of the left eye is in a state of considerable chronic inflammation, being thickened and vascular. The globe is small, contracted, tender to the touch, and is becoming quadrilateral. The cornea is opaque, flat, and contracted. At its border are two or three slightly prominent red papillæ, out of one of which a small quantity of thin, milky pus can be squeezed. Vision is absolutely gone. Tension — 3. The right eye is normal in every respect. She has been feeling out of sorts for some days, and complains of headaches and malaise.

Enucleation was performed on February 13 under ether, the heart having been previously examined and found healthy. The operation was normal in every respect, no difficulty being experienced except from the presence of some old adhesions between the globe and the orbital structures. The eyelids, etc., were well washed with carbolic solution before the operation, and care was taken to keep the conjunctival section well outside the fistulous openings round the cornea. There was little subsequent bleeding, and no escape of the contents of the globe into the orbit. The usual dressings—pads of absorbent wool wet with water and applied tightly by means of a calico bandage—were used, and the girl was sent to bed. She vomited somewhat that afternoon on recovering from the ether, but next morning was noted as "progressing favourably." There was no discharge whatever from the socket of the enucleated eye.

At 4 p.m. on the day after the operation she again vomited and complained of severe supra-orbital pain. She had no rigors either then or at any subsequent time. The pain increased in intensity, and the vomiting was severe all next day. She also complained of severe pain in the epigastrium, probably due to excessive straining.

3rd day. — Morning temperature,  $102.4^{\circ}$ ; pulse, 80.  
4 p.m.—Patient becoming dull and stupid. Temperature,  $104.4^{\circ}$ ; pulse, 84; respirations, 32. The lungs and heart were examined and found healthy. The throat was red, and

the fauces were covered with a creamy, pultaceous substance. Complained that the throat was somewhat sore. The optic discs were examined and found healthy. 8 p.m.—Had a good motion of the bowels.

4th day, 9 a.m.—Temperature,  $101.6^{\circ}$ ; pulse, 86; respirations, 32. She is more dull and stupid than before. At 5 p.m. Professor Bennett, Consulting Surgeon to the Hospital, kindly came to see the case with Dr. Story and myself. On removing the bandage the socket of the left eye was found to be filled with a blood clot—a recent hæmorrhage having occurred from the wound, which had till then looked quite typically healthy. There was also a red blush over the left eyelid and cheek spreading over the nose to the right cheek. The diagnosis of erysipelas was made, and when Dr. James Little, Consulting Physician to the Hospital, kindly saw her in the evening the blush was more distinct, and the diagnosis was confirmed. The face was directed to be painted with white lead paint.

5th day.—The blush on her face has nearly disappeared. She cannot bear to have her head moved; there is some sighing respiration. Temperature,  $104.4^{\circ}$ ; pulse, 120; respirations, 27. Right optic disc normal. She is now delirious, but only in a quiet way, never crying out loud, mere muttering, never moves of her own accord, and complains of pain when moved by the nurse.

6th day.—She has slept very little all through. She passes her urine under her unless it is drawn off by a catheter. The erysipelas-like blush has totally gone. Right optic disc normal. The diagnosis of erysipelas is abandoned.

7th day.—Began to menstruate yesterday. Evening temperature,  $105^{\circ}$ ; pulse, 155; respirations, 45.

8th day.—Delirium continued; unconsciousness complete. 1 p.m.—Temperature,  $105.5^{\circ}$ ; pulse, 160; respirations, 70.

At 3.45 p.m. on the eight day after the enucleation she died comatose.

The enucleated eye was examined immediately after its removal, and it was found that the conjunctival incision was well outside the circumcorneal papillæ. The cornea was not ruptured. The globe was small, and the sclerotic was depressed corresponding to the position of the recti muscles. Some portions of connective-tissue remained adherent to the globe



in places. A meridional section showed the choroid to be much thickened and adherent to the retina. The vitreous chamber was occupied by a dense mass of inflammatory tissue, to which the retina was inseparably adherent. In the centre of this mass was a small cavity, but no pus. A vertical incision through the cornea and through the papilla at the corneal border showed that the cornea was thin, the anterior chamber very shallow, and occupied by a dense opaque mass, glueing together the cornea and iris. The lens was absent. From the papilla a fine sinus ran towards the centre of the globe, and communicated with the small cavity in the middle of the vitreous chamber above mentioned. It must therefore have been from this cavity that the fluid escaped through the sinus. The optic nerve seemed atrophic, and its sheath lay loose around it.

The *post-mortem* examination, at which Dr. Abraham and Dr. Story kindly assisted, was made on February 20, eighteen hours after death.

The body was well nourished; there were no external marks except a large brownish-coloured bulla on the right foot over the metatarsal bones, and some patches of herpes on the lips and on the right ear. The body was not yet quite cold. Cadaveric rigidity was not well marked. On making a longitudinal incision considerable fat was found in the parietes.

*Abdomen.*—Intestines normal in appearance, somewhat distended with gas. A large finger-shaped diverticulum was found on the ilium. The omentum was covering the intestines. The stomach was small and empty; the spleen was normal; the rectum was loaded; the uterus was congested, the os being occupied by a red clot; the ovaries were congested, the right one especially; the kidneys were both deeply congested and purple, and the capsule peeled off easily; the liver was large and congested.

*Thorax.*—The lungs were normal. Pericardium contained the normal amount of fluid; no pericarditis. Heart.—Right side empty; tricuspid valves healthy. Left side.—Semilunar valves normal. The ventricles contained small, partly deco-lourised clots. The mitral valves looked thickened.

*Head.*—On removing the calvarium the dura mater was found deeply congested. The vessels on the surface of the

brain were immensely engorged. Beneath the pia mater on both sides everywhere over cerebrum and cerebellum there existed milky streaks of lymph and purulent exudation, best seen along the sulci. There was a large quantity of purulent fluid in the sub-arachnoid space. The longitudinal sinus was occupied by a partially decolourised clot. In both hemispheres the puncta cruenta were well marked. In the lateral ventricles was found a small quantity of orange-coloured fluid, with purulent deposit on the optic thalami and choroid plexuses.

The occurrence of meningitis consequent on enucleation of the eyeball, though rare, is not by any means unknown. In reviewing the literature of the subject I am, however, only able to find an account of ten other cases, the one now placed on record being the eleventh.\*

Von Graefe had two cases after enucleation for purulent panophthalmitis, and therefore laid it down as a rule that enucleation was not advisable during panophthalmitis.

Manhardt had one case.

Horner had one case. In neither of these accounts can I find the condition of the enucleated eye stated.

Just had one case after enucleation for phthisis bulbi, not purulent.

Pagenstecher had one case, also phthisis bulbi, not purulent.

Leber had a case, which recovered, after removal of an old cataractous eye with bony choroid, not purulent.

Meyhöfer had a case, which also recovered, after recent injury, forty-eight hours, not purulent.

Asplund, of Stockholm, had a case where the eye was removed for a foreign body.

Wecker had a case after removal of an eye four weeks after abscission for staphyloma, and—

My case of an old collapsed phthisical globe with a purulent cavity.

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\* Since writing the above another case has been placed on record by Dr. Griffith, of Manchester, at the recent meeting of the British Association at Belfast.

It will thus be seen that out of the eleven cases on record only two (those of Graefe) are known to be cases of active purulent panophthalmitis ; one, my case, is chronic suppuration ; whilst four are known not to have had suppuration at all, and in four the condition of the enucleated eye is not stated.

What, then, is the nature of the infection, and what its mode of propagation ? If, as Graefe believed, the pus escaping from the eye infected the recent wound, and was conveyed directly by the optic nerve sheaths to the brain, how happened it that infection occurred so frequently when there was no pus in the eye ? In these cases the infection must have occurred from without at the time of the operation or subsequently.

In my case there was probably no escape of pus into the wound, for there was none in the cavity of the eye, nor could any be squeezed out of the sinus immediately before the operation. It does not, therefore, seem that purulent disease of the enucleated eye is by any means a necessary condition of consequent purulent meningitis.

The experiments of Schwalbe, confirmed by Schmidt and Manz, show that a tolerably free communication exists between the arachnoid and the intervaginal space surrounding the optic nerve. Fluids injected into the arachnoid space passed down between the external and internal sheaths of the optic nerve to its ocular extremity, where it collected, being unable to pass into the eye.

The presence of *phthisis bulbi* with atrophy of the optic nerve and a loose sheath would presumably facilitate the transit of infecting agents, and this condition was present in at least four cases out of the seven of which I can obtain information, whilst only three out of the seven were purulent.

NOTE.—There is yet another aspect from which such cases might be viewed. How far are they mere coincidences ? Meningitis comes on in many cases from unknown causes, and in some cases from purulent

disease of the eyeball without enucleation. How far is it a *post hoc*, and how far a *propter hoc*? A microscopical examination and comparison of the optic nerve near the orbit and near the brain might settle this.

The condition of the throat and the kidneys suggested scarlatina, and on enquiry I found that there had been cases of scarlatina and of erysipelas in the neighbourhood from which the girl came, and the former had exhibited many varieties in its mode of attack.

*On Sections of the Optic Nerve and some other parts, from Dr. Arthur Benson's Case of Meningitis after Enucleation.—P. S. Abraham, M.A., B.Sc., F.R.C.S.*

Sections were taken from the left optic nerve, including its sheath, at different distances between the eye and the optic chiasma, as well as sections from the latter, and from the root of the right optic nerve. They were stained, some with picrocarmine and logwood, others with methyl blue.

One of the kidneys was also examined microscopically, and presented marked changes. These are extreme hyperæmia, the vessels being largely distended with blood and bulged in places. No extravasations, however, have been detected. The urinary tubules are for the most part entirely occluded by the swollen and granular epithelial cells, which have nearly everywhere lost their marginal boundary or contour. The matrix of the organ is irregularly studded with collections of inflammatory cell-growth.

The nerve is profoundly altered, and no distinct nerve-fibres can be made out. The perineurium and the interfibrillar prolongations of connective tissue are greatly hypertrophied. The spaces which these fibrous septa enclose are occupied by a continuous granular material, freely interspersed with nuclei. The connective tissue of the framework is itself filled with proliferating cells, which are massed together in some places. The sheath of the nerve is very much thickened, and towards the outer boundary the fibrous bundles are separated by spaces containing numerous small cells and nuclei, and further out still these are sufficiently numerous to be looked upon as purulent deposits. The supravaginal and subvaginal sheaths likewise

contain pus. All this applies particularly to the sections taken within the orbit, some of them being from a point quite near to the eye, and others close up to the foramen.

In the sections taken from the intracranial part of the nerve the peri- and endoneurial connective tissue is also the seat of the inflammatory cell-growth, which in the periphery is extensive enough to form collections of pus. The intracranial part of the right optic nerve is very similarly affected, numerous small cells being thickly situated in the perineurium, and extending some distance into the fibrous septa within the nerve. The orbital portion of this nerve was not retained for examination.

In the sections of the optic chiasma the principal thing observable is the purulent infiltration and deposits in the pia mater covering.

Several of the various sections were stained with methyl blue, and in these numerous small micrococci can be detected within and among the pus-cells.

Although a great many sections of the left nerve have been taken and examined with great care, they appear to present but little satisfactory evidence as to whether the inflammation extended from the orbit or from within the cranium. The condition of the right nerve, however, is significant, for it proves that in this case the inflammation must have extended into its substance from within the cranium.

## WOUNDS OF THE SCLEROTIC, WITH REMARKS ON THEIR TREATMENT BY SUTURE.

BY SIMEON SNELL,

OPTHALMIC SURGEON TO THE SHEFFIELD GENERAL INFIRMARY.

CASE I. John Arthur P., aged 16, was admitted a patient at the Sheffield General Infirmary on June 16th, 1884.

A short time before his admission (10 a.m.) he was waiting for a small axe to be glazed, and this had flown off and hit his right eye. On examination by me at 12.30 the upper eyelid was found ecchymosed and much swollen, and its lower edge was slightly cut towards its inner half for a short distance; the eyeball was softened and collapsed looking; the anterior

chamber was nearly filled with blood, and much deepened from the falling back of the iris and lens. On separating the eyelids with a speculum, a wound in the sclerotic, measuring more than a quarter of an inch in length, was found. It was a clean wound, somewhat oblique in direction and was situated between the superior and internal recti, and towards the equator. Vitreous had been lost in some quantity, and was escaping during the examination.

Previous experience had taught me the extreme utility of uniting wounds of the sclerotic by suture, even in apparently hopeless cases. It was decided to treat the present instance in like manner.

A needle threaded with fine gut was therefore passed well under the divided conjunctiva on either side of the scleral wound, and then tied tightly. In this way the aperture in the sclerotic was effectually closed without immediately suturing it. Atropine was ordered to be dropped into the eye twice daily, and a pad of lint, wetted, was placed over it.

The swelling of the upper eyelid speedily subsided, and he was soon able to distinguish fingers. The suture was removed on June 23rd. The hæmorrhage in the anterior chamber cleared up, and also more slowly that in the vitreous became absorbed. On August 5th it is mentioned that  $V = \frac{29}{70}$ .

At the time of writing (September 17, 1884) the eye to outward appearance is as good as its fellow; the pupil is round and moveable; the scar in the sclerotic is with difficulty detected, and with the ophthalmoscope corresponding to the external wound, is a large white patch of atrophy; in the vitreous are one or two fixed filamentous bands; vision remains about the same. Dr. Crawford Renton, of Glasgow, who was visiting me, verified the condition of this boy's eye, and also remarked on the normal tension.

CASE II. In the early morning (6 a.m.) of the 24th July, 1878, I was visited by J. M., aged 28, under the following circumstances:—He was a compositor in a newspaper office, and on returning home about four o'clock, was drawing the cork from a bottle of beer, and the bottle breaking, a piece of the glass had hit the right eye. When I saw him there was a large wound in the sclerotic; it commenced on the inner side of the cornea at its lowest part, but just external to the ciliary



region, and it extended downwards and outwards. It measured half an inch in length. Vitreous had escaped, the eyeball was collapsed, and in such a state that the prospect of recovery of sight was apparently very slight. Moreover, this was the unfortunate man's working eye, for a year or two previously he had been under treatment for choroiditis in the left.

The wound in the sclerotic was united by a single suture of fine silk at its middle. He was removed home and treated there for the next two or three weeks. I have no date as to when the suture was removed: probably it was the third or fourth day. He made an admirable recovery, and always said the eye was as good as before. On February 23rd, 1881, I met him in the street and took him with me to test his vision. He then read J. 1 easily, and had  $\frac{20}{100}$ . He had been able to continue his employment as formerly.

Later satisfactory reports reached me. It may be added that when recovery had taken place the wound in the sclerotic was detected only by a faint greyish mark.

The cases I have related are good instances of conservative ophthalmic surgery. The condition of both when first seen was such that it would have been difficult to have found fault with any who had ventured to suggest the propriety of enucleation, and this immediately instead of waiting, as it might be said, for it later on.

It is to be hoped that the value of suturing scleral wounds is recognised and adopted among ophthalmic surgeons. In many instances its use has been successfully exemplified. A youth, under my care in 1877, had in the sclerotic, below the cornea, a wound a quarter of an inch long, and this aperture being closed with fine gut he made a perfect recovery, reading easily J1. This result I know has held good. In the *British Medical Journal*, vol. 1, 1877, p. 228, I recorded a case in which a sclerotic wound three-quarters of an inch in length was united by a loop of fine platinum wire. The immediate result as far as vision was concerned

was satisfactory, and remained so for some time. About two years later, however, useful vision was lost, but he still retained, to look at, a good eye. In other hands, I am aware, good results have also followed.

A few words as to the kind of suture and the manner of inserting it. The second case, I have related, did very well with a silk suture, and other cases have also succeeded with it. In other instances, I have employed fine platinum wire, and over other metals it possessed the desirable quality of not being prone to oxidise. Fine gut is unquestionably the best suture for our purpose ; its use in surgery has been established under the antiseptic system, and in numerous ophthalmic cases, such as abscissions, it has been most serviceable. It is not liable to cause ulceration along its track, as other sutures are, and it may be removed when one pleases, or in some instances not at all.

The mode of inserting the suture is of importance, and I believe the plan about to be mentioned is of great service. For some time past I have treated all scleral wounds, whether accidental or purposely made in order to introduce the electro-magnet into the vitreous cavity in search of a foreign body, by dragging the edges together, by suturing tightly the conjunctiva alone. It appeared to me desirable to avoid the puncture of the sclerotic on either side of the wound with the needle, as well as the underlying choroid and retina, for although the puncture would be small, on either side the suture would pass through the tissues, exciting more or less irritation ; and then again, the loop inside would compress the retina and choroid and act as a foreign body in the interior of the eye, where the vitreous would be already broken up. Moreover, there is the further disturbance of the wounded surfaces in removing the suture. In the plan I adopt these evils are avoided.

A needle threaded with fine gut is passed well underneath the conjunctiva on either side of the scleral wound. The gut is tightened, and in drawing together

the conjunctiva at the same time closes the deeper aperture. In fact, the sclerotic wound is treated, as much as possible, as a subcutaneous one. The suture is removed in a few days or later, as desired, without disturbance to the wound in the globe.

Two points contribute greatly to the successful treatment of these cases, viz., that they should be treated in the manner indicated very soon after the accident, and that the wound should be a clean one.

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R. DEUTSCHMANN (Göttingen). On the Experimental Production of Sympathetic Ophthalmitis. *Von Graefe's Archiv.*, XXIX., 4, p. 261.

In his earlier experiments on this subject (*vide* O. R., vol. II., p. 22) Deutschmann succeeded in producing a papillitis in the second eye, but failed to obtain an inflammation of the uveal tract; his results, therefore, remained open to the objection that the changes produced were not of the same nature as those known clinically as sympathetic. Experimenting again in the same way as before—namely, by injecting into one eye of the rabbit spores of *aspergillus fumigatus* suspended in a three-quarter per cent. solution of common salt, he has succeeded in exciting what appeared like a typical sympathetic inflammation in the fellow eye. Acting on the supposition that the failure in the former experiments depended on the spores becoming encapsuled, and consequently inert, before the full effect could be produced, he followed up the initial injection with a second, third, and fourth during the course of twenty-four days. In two rabbits the experiment failed, in a third it succeeded.

At the end of the first week the fellow eye showed only hyperemia of the papilla, shortly followed by changes in the adjacent retina; a week later slight vitreous opacities were visible, which rapidly increased with obscuration of the swollen papilla; and at the end of the fourth week a large number of small prominent yellow bodies appeared in the choroid, and quickly increased in number till the whole of the lower half of the fundus was thickly strewn with them. For fear that the

nature of the process might become obscured if further changes were waited for, the animal was then killed and the parts examined.

As in the earlier experiments, the injected eye showed suppurative iritis with a similar affection of choroid and retina. The infiltration of the choroid was continued directly into the inner sheath of the optic nerve. Following the nerve towards the chiasma there was interstitial neuritis and perineuritis, with infiltration of pus cells, the changes being most marked at the bulbar end of the nerve. The perivascular lymph spaces were dilated. The chiasma itself was but slightly infiltrated, its pial covering strongly so. The second nerve showed moderate interstitial neuritis, with dilatation of the lymph spaces and infiltration of the sheaths, these changes increasing in intensity towards the globe. The papilla of the sympathising eye was strongly inflamed, the adjacent choroid thickened three or four fold, and consisting of masses of pus cells. Similar changes, differing only in degree, extended forwards to the ora serrata. The iris unfortunately escaped examination. The vitreous was freely infiltrated with fibrin and pus cells. No changes were found in the ciliary nerves.

Deutschmann points out that the inflammatory changes appear to subside early in the structures which they traverse between the one eye and the other—viz., the optic nerves and chiasma, while they are more persistent and intense in the eyes themselves; and urges that the absence of visible change in the nerves in a late stage of sympathetic ophthalmitis is no proof that they have not transmitted an inflammation earlier. He also points to the participation of the pia mater at the base of the brain as being clinically important. Mooren has recorded cases of sympathetic ophthalmitis with brain symptoms.

The outbreak of sympathetic inflammation at long periods after the injury of the first eye, he would explain by supposing the septic material, whatever it may be, to become encapsuled and inert, but not destroyed, and subsequently, through some change in the eye, to be again set free. He thinks that the great rapidity with which the choroidal infiltration spreads as compared with the retinal, explains the fact of sympathetic inflammation manifesting itself clinically chiefly in the uveal tract.

P. H. MULES (Manchester). Secondary Septic Ophthalmitis. *Arch. of Ophth.*, XIII., 2., p. 201.

In opposition to a recent paper by Theobald, Mules declares decidedly in favour of the infective theory of sympathetic ophthalmitis, and makes a new suggestion as to the relation between reflex nerve action and the essentially different condition, *secondary septic ophthalmitis*.

Recent observations have shown two factors to be connected with the disease in question: dilatation of perineural lymph spaces, especially at the posterior part of the eye, and development of micro-organisms. The author suggests that while the micro-organisms are the essential cause of the inflammation in the second eye, their access to it depends upon the dilatation of the lymph passages, and that this latter is a result of a reflex neurosis. Hence, he thinks, the long period sometimes intervening between the injury of the first eye and the septic invasion of the second, the conditions for the migration of the poison being absent until, with the access of irritative changes, the lymph channels become enlarged. Hence, also, the advantage unquestionably gained in some cases of true inflammation by excision of the infecting eye; sympathetic inflammation being present sympathetic irritation may retard, if not prevent, its recession. He objects to the old name sympathetic inflammation as erroneous and mischievous, and desires the substitution for it of the term *secondary septic ophthalmitis*.

C. H. J. WARDEN and L. A. WADDELL (Calcutta). The Non-bacillar Nature of Abrus-poison, with Observations on its Chemical and Physiological Properties. *Calcutta: Bengal Secretariat Press*, 1884.

This is an illustrated volume of seventy-eight pages devoted entirely to the now famous jequirity bean. It embodies the results of an extensive original research concerning the supposed bacillus of jequirity, and the real nature of the jequirity poison.

Part I. deals with the bacterial theory of the action of the Abrus-poison. In their experiments on this question the authors had the advantage of the immediate superintendence

of Dr. Koch while at Calcutta on the Cholera Commission. Their results show that the tonic effects of the abrus seeds are not due to bacilli. The chief facts established by the experiments were these :—

1. Absence of bacilli or their spores in the seeds. In one culture experiment, where an imperfectly sterilised seed was used, bacilli were found, but these proved to be non-pathogenous to cats, fowls, and mice—the animals used throughout these experiments.

2. Unsterilised abrus-seed infusion strongly favours the growth of bacteria, partly perhaps on account of its highly albuminous composition. But no special form of bacillus was found constantly in all the specimens; and all the bacilli and cocci found were innocent.

3. The local action of unsterilised infusion is usually accompanied by bacterial formation; but the bacteria found are of various kinds, and non-pathogenous. They enter the wound (1) in the injected fluid, or (2) from the syringe during the process of injection, or (3) afterwards, when the reduced vitality of the part allows the degenerated tissue to become invaded by bacteria from the air.

4. The intensity of the topical action of abrus-seed infusion, like that of other chemical irritants, depends upon the concentration and number of applications.

5. The toxic action of unsterilised abrus infusion is not necessarily associated with a generalised bacillar formation. The characteristic anatomical lesions are a profound alteration in the organised elements of the blood and the occurrence of generalised minute hæmorrhages into the substance of most of the highly vascular tissues and viscera. The hæmorrhages appear to occur by diapedesis without rupture of the capillary walls. These grave disturbances in the circulation, by lowering the resisting power of the tissues, favour the local development of any bacilli which may be carried to those remote parts with the circulating blood.

6. With large doses of the poison death quickly occurs, accompanied by all the characteristic lesions, but too rapidly to be attributable to bacterial invasion. And direct exami-



nation shows the complete absence of bacteria both in the blood and at the seat of the hæmorrhagic extravasations.

7. When bacilli are found in the blood, their presence is purely accidental; and they are non-pathogenous and non-specific.

8. The blood of an animal killed by abrus-poison is not infective.

9. Varying doses produce definite effects proportionate to the largeness of the dose, in the same manner as any other chemical poison.

10. A short exposure to a temperature of  $60^{\circ}\text{C}$ . is sufficient to destroy completely the activity of the poison; and this temperature is much too low to effect the destruction of bacteria.

11. The statement that, like the specific fevers, one small dose, when recovered from, confers immunity against further inoculation, is disproved. A preliminary dose, on the contrary, appears to precipitate the fatal result.

Part II. treats of the chemical nature and the mode of action of the abrus-poison. An earlier research by Dr. Warden had proved that the seeds contain no volatile or fixed alkaloid or glucoside, and that the crystalline acid—*abric acid*, is inert; it was clear, therefore, that the active principle must belong to a different category from that which includes ordinary vegetable poisons, and that unusual means were necessary for its detection and isolation. In filtered watery infusions of the seeds an opalescent haze speedily forms on exposure to the air; this precipitate, separated by filtration, was proved by experiment to be, or to contain, the active principle of the seeds. It is a proteid body existing in the seeds in a form which is soluble in water, and not precipitated from it by strong acids, by alkaline carbonates, or by chloride of sodium. It thus behaves like a native animal albumin. It is, however, precipitated, like globulin, from its watery solution by a current of carbonic anhydride, but re-dissolves as the carbonic acid evaporates. The precipitate obtained in this way is readily soluble in distilled water. Boiling the watery infusion for an instant renders the poison permanently inert, and a short exposure to a temperature of about  $70^{\circ}\text{C}$ . does the same. A temperature considerably below that necessary to coagulate albumen is sufficient to lower

its activity. Experiments showed that the effect of heat in destroying the activity of the watery infusion is not due to simple coagulation of the proteid, for it also occurs when coagulation is prevented by solution in an alkali or an acid.

Moisture plays a very important part in facilitating the decomposition which occurs through heat, for although the exposure of the watery infusion for an instant to a temperature of  $100^{\circ}\text{C}$ . suffices to destroy altogether the activity of the poison, the *dried* seeds may be exposed to a temperature of  $100^{\circ}$  for several hours without having their activity seriously deteriorated. But prolonged exposure to  $100^{\circ}$ , even in the absence of air and moisture, serves also to destroy the activity.

The separation of the active principle in a pure form is difficult on account of its great susceptibility to heat and its association with abric acid and extractives. Two methods by which it may, however, be effected are described by the authors. The active principle is a proteid, the composition of which approximates closely to that of egg-albumen and the vegetable albumens. It exists in large quantities in the root and stem of the plant as well as in the seeds, and may be considered to be nothing more or less than an albumen peculiar to the *abrus precatorius*. The authors give to it the name *abrin*. It is much more active than an equal weight of the powdered seeds. Cold water readily dissolves it, and it is also soluble in glycerine.

Experiments were made to ascertain whether abrin possessed, as appeared probable at first, properties which would ally it with the soluble ferments, *e.g.*, papayatin, ptyalin, and pepsin; this was found not to be the case. Abrin must, therefore, be regarded simply as a *chemical poison of a proteid nature*.

Abrin bears in many ways a strong analogy to snake-poison. Like snake-poison, it may be taken by the mouth with impunity; it is only when introduced into the subcutaneous tissues, or directly into the circulation, that toxic symptoms develop. Heat lessens the activity of both poisons, but affects abrin much more powerfully. The toxic symptoms of these two poisons also exhibit a certain amount of similarity—general depression, drowsiness, fall of temperature, and hæmorrhagic lesions being more or less common to both.

A short account is given of the action of *abrus*-poison on the various systems and tissues of the body ; on these points the authors propose to publish more complete observations later.

In an appendix are given the botanical characters of the plant ; an interesting account of the way in which natives of India prepare from it a poisoned spike with which to kill cattle and even to commit murder ; and a brief notice of its use in ophthalmic practice.

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## REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY.

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HELD AT HEIDELBERG,

ON THE 15TH AND 16TH SEPTEMBER, 1884.

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BY H. R. SWANZY, F.R.C.S.I., AND J. B. STORY, F.R.C.S.I.

On the 15th September the Society met at 9 a.m. in the Hotel Schrieder, Dr. Noyes, of New York, in the Chair.

Dr. Ulrich read a paper on *The Pathogenesis of Glaucoma*. The author regards infiltration and sclerosis of the iris as the two great factors in the production of glaucoma, and relies on the results of injections into the vitreous humour as proofs of this theory. He gave a brief sketch of the experiments and theories of Knies, Weiss, and Ehrlich, which, in the main, agreed with his results, viz., that, in the normal eye, the filtration stream passes through the root of the iris, but, after paracentesis of the anterior chamber, makes its way through the pupil. This is opposed to the views of Schoeler and Uhthoff, who found the stream to pass always through the pupil. He has lately injected fluorescein and ferrocyanide of potassium into the vitreous humour. When he increased the strength of the flow of intraocular lymph by forming a fistula in the cornea through which the aqueous humour kept oozing out, the colouring matter became more rapidly deposited in the perilental space, the root of the iris, and in the space of Fontana. The author's theory is supported by a case of glioma of the retina which he had under his care, and in which there were present in the

anterior chamber seven or eight minute pearl-like pellets, which moved freely to and fro with every motion of the eye, and in which the perilental space was infiltrated with glioma cells, as also Fontana's space and Schlemm's canal. This case corroborates one of Brailey's.

The author also observed a case of buphthalmos, in which the perilental space and Fontana's space were filled with hæmorrhagic exudation, and  $\frac{1}{2}$  mm. of the periphery of the iris was infiltrated with similar exudation. There was a cock's-comb-like elevation of the iris on its anterior surface close to the angle of the anterior chamber, and this was triangular in section, the apex almost touching the membrane of Descemet. This elevation is accounted for by the perilental stream passing through the root of the iris. Schnabel and Brailey have described cases substantiating this theory of the production of the elevation in question. As regards sclerosis of the iris, it must be remembered that the senile iris differs from that of the child in several respects. The vessels of the young iris have a delicate adventitia, rich in cells, while the senile iris has a firm adventitia with no cells. The child's iris, too, has no white nerve fibres. The sclerosis shows itself chiefly by a sclerosis of the tunica adventitia of the vessels, which sometimes goes so far as to obliterate their lumen by thrombosis, while a compensating dilatation occurs at other places. The sclerosis shows itself also by pigmentation of the iris stroma. By injection experiments the author showed the presence of nearly five times as many ciliary blood vessels in the normal eye as in the glaucomatous eye. In secondary glaucoma, due to ring synechia, the author also found sclerosis of the iris. He regards the dilatation of the vessels in the ciliary body, seen by Brailey in glaucomatous eyes, as compensatory in its nature, and as depending upon the sclerosis.

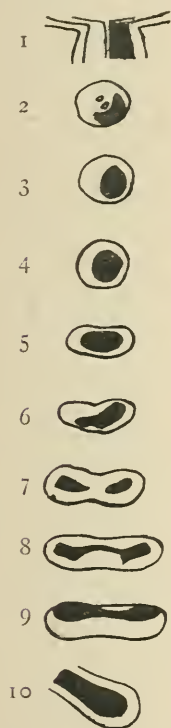
Glaucoma then, according to Dr. Ulrich's theory, takes its origin in a sclerosis of the iris, the result either of inflammatory processes or of senile changes. This is followed by circulatory disturbances which cause a rise of tension, the lens advances, presses the root of the iris against the cornea, and the well-known glaucomatous symptoms arise. The author explains the action of eserine as chiefly due to a stretching of the iris vessels making the circulation of the blood possible.

Dr. Uhthoff (Berlin) and Prof. Schmidt-Rimpler (Marburg) took part in the discussion, the latter stating that a series of experiments which he has at present in hand fully bear out Dr. Ulrich's view that the stream of filtration passes through the root of the iris.

Dr. Uhthoff (Berlin) read a paper on *The Course of the Fibres in the Optic Nerve*. He detailed the particulars of three rare cases which he had observed during life in the Charité Hospital at Berlin (Westphal's Psychiatric Clinique), and of which he afterwards obtained *post-mortem* examinations. "For many years the author has systematically examined all the lunatics in this Clinique with the ophthalmoscope. [*Vide* his former communications "On Ophthalmoscopic Investigations in Lunatics," *Proceedings of the Ophthal. Soc.*, Heidelberg, 1883, and "On the Changes in the Fundus Oculi in consequence of Alcoholism," *Berliner Klin. Wochenschrift*, 1884.] The first patient, the *post-mortem* appearance of whose optic nerves Uhthoff described, was a man, aged 40 years, labouring under tabes. In his left eye only there was a quadrant-shaped atrophy of part of the papilla at its lower and outer part, and in the field of vision a corresponding defect upwards and inwards. The condition of the eye remained unaltered until the patient's death. The vision (central) in each eye was normal. A series of microscopic sections of the optic nerve showed how the atrophic fibres ran, *i.e.*, those supplying the lower and outer quadrant of the retina. The bundles, close behind the globe, had a quadrant-like shape and lay in the lower and outer part of the nerve. Gradually, as we pass backwards, the atrophic portion approached more the under surface of the nerve and assumed a half-moon shape. In the intracranial part of the nerve the diseased portion was situated at the lower surface of the nerve, and had a triangular shape with the apex above, and the degeneration, which was a simple grey atrophy, did not extend beyond the chiasma.

The two other cases were *post-mortems* of alcoholic amblyopia with the ophthalmoscopic appearances of atrophic paleness of the outer half of the papilla. The author has found in 400 cases of severe alcoholism (delirium tremens, etc.) about 70 cases of atrophic paleness of the outer

half of the papilla, which he regards as of diagnostic importance, as being caused by the alcoholic abuse. In only about one



#### ALCOHOLIC AMBLYOPIA.\*

1. Horizontal section of optic nerve.
2. Cross section at papilla.
3. At middle of orbital portion.
4. In optic foramen.
5. Anterior intracranial portion.
6. Close in front of chiasma.
7. Anterior part of chiasma.
8. Middle " " "
9. Posterior " " "
10. Optic tract.



#### TABES.\*

1. Ophthalmoscopic.
2. Immediately behind globe.
3. At middle of orbital portion.
4. Anterior intracranial portion.
5. Close in front of chiasma.

The shaded areas represent the atrophic portions.

\* These figures do not pretend to any great accuracy. They are taken from rough pencil sketches given to the Reporters by Dr. Uthoff.



half of these cases was amblyopia present, or, according to the history, had it previously been present. In the other half there was no disturbance of vision, nor had any existed ; but, even here, the author regards the pathological significance of the ophthalmoscopic appearances as the same. Both of the patients who came to *post-mortem* examination in the Charité had marked atrophic paleness of the outer half of the papillæ, with central scotoma and free peripheral fields. The microscopical examination of the optic nerves showed partial neuritic atrophy, especially marked in the intraorbital portion of the nerve (development of the interstitial connective tissue, cell growth in the latter, formation of new vessels, etc). The author exhibited a number of drawings of the appearances, and showed for comparison drawings of atrophy of the optic nerve in progressive paralysis, tabes, and multiple sclerosis.

With regard to the course of the optic nerve fibres, Uhthoff agrees completely with the views of previous investigators (Samelsohn, Nettleship, Vossius, and Bunge). The degenerated portion is situated in the lower part of the papilla, and is wedge shaped; close behind the bulb it becomes more half-moon shaped, and gradually passes towards the centre of the optic nerve and away from its surface. In the chiasma the degenerated portions are visible in both sides, they approach each other, finally unite, and lie in the posterior part of the chiasma on its dorsal surface. In the tractus opticus the diseased parts lie in the centre, stretching from thence inwards and upwards.

The optic nerve, then, according to the author, is a slightly twisted cord (quarter of a turn) in whose axis far back the papillo-macular fibres run, while more towards the front they move to the outer surface of the nerve.

Dr. Vossius detailed the results he had obtained from *Inoculation Experiments with Leprous Matter*. The matter contained bacilli which closely resembled the well-known tubercle bacillus, the difference between the two consisting in this, that the bacillus of leprosy were moveable, while those of tubercle are motionless and in a fuchsia solution became much more rapidly stained than the tubercle bacillus. Moreover, when tubercle bacilli are introduced into the anterior chamber they rapidly produce iritis, followed by general tuberculosis, while the bacilli of leprosy have been introduced

into the chamber by many experimenters without any result whatever. Dr. Vossius experimented upon seven rabbits, of which three died before any pathological changes had taken place in the debris. In the other four, whitish spots became deposited in the iris and on the anterior capsule in from four to six weeks, and from this, a deposit having been precipitated at the lower portion of the anterior chamber, the space of Fontana and the ciliary body became involved. The microscopical examination demonstrated absence of bacilli in the centre of these little tumours, but countless masses were visible in their peripheries, as also in the space of Fontana, iris, etc. The author endeavoured in vain to procure a pure growth (*Rein-cultur*) of this lepra bacillus.

Dr. Nieden (Bochum) referred to his experiences in Madeira, where he had seen a number of cases of leprosy. The period at which the eyes became affected varies, sometimes being early in the course of the disease, but generally not until four or five years after its onset. He narrated an interesting case in which the child of healthy English parents contracted the disease through the milk of its nurse. The latter showed signs of leprosy during lactation, and died eventually of the disease, but the child remained perfectly healthy until the age of 15, when leprosy showed itself, and the patient died of that disease four years later. In Madeira the popular belief is that the disease is only hereditary. He stated that Goldschmidt had tried injection experiments in Madeira with negative results.

Dr. Edward Meyer (Paris) had lately seen a large number of cases of leprosy in Norway. Of the two forms, the macular and the tubercular or anæsthetic, it is the latter which principally attacks the eye, and it exhibits its anæsthetic character there also. On the palpebral conjunctiva it much resembles lupus, but on the conjunctiva bulbi and on the cornea the appearance in the early stages in many cases simulates tertiary syphilis. The following signs may be regarded as pathognomonic of the disease even in the early stages, viz. :—Atrophy of the muscles between the thumb and the fore-finger, and a thickening of the skin over the eyebrows. The disease is contagious as well as hereditary. Inoculation experiments made in Norway have failed to produce general leprosy.

Dr. Kruger (Frankfort-on-Main) and Prof. Laqueur (Strasburg) joined in the discussion.

Dr. Eversbuch (Munich) gave the results of his *Microscopical Investigations into the Muscles of the Iris*. He had examined in all the eyes of 25 different species of animals, including man. In no animal could he find evidence of the presence of dilator fibres, except in the horse, where a few bundles occurred, as it were, sporadically. His views differ from those generally held, and agree in the main with Schwalbe's. His method has been to make a continuous series of sections both parallel and perpendicular to the surface of the iris, the tissue being stained *en masse* before cutting. The tissue, which is found occupying in mammals the position which the striated dilator muscles do in birds, is not muscular, but is in fact a structureless membrane. What has deceived many observers, has been the strong resemblance between the nerves of the iris and nonstriated muscular tissue. The author himself fell into this error for a time, but was able to correct it by meridional sections, which demonstrated that the apparent muscles were really nerves, which could be followed far into the ciliary body. In men and apes there is absolutely nothing which could be considered a dilator muscle, and in the mammals with oval pupils there is an outgrowth of the sphinctor at each end of the oval, the fibres from each side forming a dense network; but this, though radiating in its direction, acts as a sphincter and not as a dilator. The physiological questions, as to the methods of dilatation and contraction of the pupil, the author did not propose to enter upon, but left to experimental investigation.

Dr. Brettauer (Trieste) read a short paper by Dr. Carl Kollar, of Vienna, upon *Local Anæsthesia of the Cornea and Globe by means of Cocain*. As the result of experiments upon animals, the author had found that the instillation of a few doses of a two per cent. solution of muriate of cocain (already well known to laryngologists) into the conjunctival sac rendered the cornea and conjunctiva quite anæsthetic. The anæsthesia lasted ten minutes, during which time the anterior surface of the globe could be cut, torn, scratched, or rubbed, without sensation. Only when the anterior chamber was emptied by paracentesis and the iris touched were sensory phenomena produced. Dr. Kollar had then experimented on himself and on other men with the following results:—One or two drops of

a two per cent. solution instilled into the eye produce a slight sensation of burning, in two minutes the cornea and conjunctiva become partially anæsthetic, and completely so in from ten to fifteen minutes, and this lasts for ten minutes. The drug causes a slight mydriasis, which lasts a couple of hours, and is accompanied by some paresis of accommodation, but reaction to light and eserine is not obliterated. [The Reporters had the opportunity of examining a patient in Professor Becker's hospital, into whose healthy eye two drops of the above solution were dropped. Thirteen minutes later the cornea and remainder of the anterior surface of the globe, and the inner surface of the eyelids as far as their margins, were so anæsthetic, that a dimple was made on the cornea with the point of a fine lachrymal probe, the bulbar conjunctiva seized with a fixation forceps, and the eyeball moved by it in different directions, and a spring wire speculum inserted in the usual way, without the slightest unpleasant sensation on the part of the patient, or any lachrymation or injection of the eye being produced. The anæsthesia lasted for ten minutes or longer, and was then gradually disappearing. Some dilatation of the pupil accompanied the anæsthesia, but reaction to light remained. It is needless to point out how important this discovery promises to be in ophthalmic surgery for many operations, foreign bodies on the cornea, &c.]

Prof. Schmidt-Rimpler (Marburg) observed that he had tried a five per cent. solution of bromide of potassium to produce the same effect with a certain degree of success, but the anæsthesia was not comparable with that caused by the drug just brought forward in Dr. Kollar's paper. [It may be mentioned that Dr. Kollar, who is a general physician and surgeon, discovered the above-mentioned property of cocain only a fortnight before the date of this meeting.]

Prof. Schweigger (Berlin) made a communication on *Resection of the Optic Nerve*, which he employs in suitable cases as a substitute of enucleation. The author combated the usual objections to the method, the chief of which is that enucleation is thereby often only postponed. He alluded to the physiological experiments of Knies, and the pathological investigations of Deutschmann, and stated that their results

justified the hypothesis, that the cutting of the vaginal lymph paths will stop sympathy, but that to insure success a piece of the nerve should be excised. The author prefers resection to enucleation, inasmuch as a larger piece of nerve is removed, and the advancing inflammatory process may happen to have reached that portion of the nerve, but not gone beyond it. The author has always seen persistent partial corneal anæsthesia to follow resection. The pupil becomes dilated, but reacts to eserine. He has not seen atrophy of the eye follow resection, except in cases where it would have come about under any circumstances. In two cases out of 100 resections he had performed, he observed a slight neuro-retinitis in the sound eye to come on some few days after the operation. In one of these cases the vision became slightly defective, but the condition in each case disappeared in the course of 14 days, and did not return nor leave any evil effects. He accounts for this transitory neuritis by the entrance of blood into the vaginal lymph spaces. The same thing would probably occur after enucleation, but for the free exit which is present for the blood.

The operation is performed as follows:—1st stage: Division of the conjunctiva over the internal rectus. 2nd stage: Division of the muscle; two threads having been first inserted into it, one as far back as possible, the other close to the sclerotic, the muscle, the while, being kept tense between these two points by aid of two strabismus hooks passed under it. The section is made about 5 mm. behind the insertion of the muscle. 3rd stage: Division of the nerve as far back as possible. 4th stage: Abscision of the stump of the nerve from the sclerotic, and stripping the posterior surface of the globe of all adhering tissues. 5th stage: Drawing the cut ends of of the muscle together by means of the sutures already lying in them, and inserting a few sutures to close the eyelids so as to produce pressure on the eyeball, and thus promote absorption of the blood in the orbit.

In the discussion, Dr. E. Meyer states that he approves both of optico-ciliary section and resection, but does not see any advantage in the latter. He operates from the external rectus. He has never had troublesome hæmorrhage or any affection of the good eye. Nor has he ever had to enucleate after a section. He is confident of his results, as he obtains half-yearly reports of their condition from all his patients.

Prof. Hirschberg entirely disapproved of the operation; but, as the members were all acquainted with his views, he would content himself with this protest.

Prof. Schmidt-Rimpler called attention to the importance of following Schoeler's plan of pressing on the globe by means of a sponge immediately after division of the nerve, and keeping up this pressure until all hæmorrhage ceased.

Dr. Uhthoff (Berlin) stated that in Schoeler's Clinique optico-ciliary neurotomy was only practised in certain cases that were suitable for such an operation.

Dr. Boucheron (Paris) combated the objections that have been brought against the proceeding, and mentioned that the most complete dissection of the whole back of the sclerotic, even with division of both oblique muscles, fails to completely destroy corneal sensibility. He thinks, therefore, that the return of corneal sensibility is no objection to the method.

The Second Meeting of the Society was held at 2 p.m. on the same day in the Ophthalmic Clinique, under the presidency of Prof. Schweigger.

The business consisted of the following Demonstrations :—  
Dr. Ulrich, *Glaucoma Preparations*; Dr. Vossius, *Lefra Preparations*; Dr. Eversbusch, *Iris Preparations*; Dr. Plehn, *An Optometer*; Dr. Mayerhausen, *A Self-Registering Perimeter*; Dr. Müller, *An Artificial Eye*; Dr. Nieden (A), *A Modification of Sattler's Galvano-Cautery*, and (B) *An Instrument for Employing Spectral Colours in Ophthalmic Practice*; Prof. Hirschberg, *Metastatic Carcinoma of the Choroid*.

Hirschberg stated that the case he now brought forward was the third published, in which mammary carcinoma had appeared metastatically in the choroid. Prof. Manz (Freiburg) said he had this very year seen a similar case of metastasis of carcinoma in the eyeball of a woman from whom mammary tumours had been previously removed.

The Third Meeting of the Society was held at 9 a.m. on Tuesday, 16th September, in Schrieder's Hotel, Professor Hirschberg in the chair.

Prof. Otto Becker (Heidelberg) made a communication upon the *Structure of the Lens*, in which he described a peculiar



concavity outwards of the new fibres at the equator. As we pass inwards the fibres become straight and finally concave inwards.

Prof. O. Becker then read a paper on the *Etiology of Cataract*. The author criticised Deutschmann's theory that cataract is frequently the result of kidney disease, and stated at length the methods he had employed to test its truth. Since Deutschmann's publications Prof. Becker had made exhaustive observations on the point in question. He has found that ten per cent. of all persons with cataract exhibit albuminuria, but so many of these were senile individuals that a large percentage of nephritis is not remarkable. The author then proceeded to ascertain the frequency with which nephritis occurs in persons above 35 years of age by examining 500 individuals in various public institutions. He found amongst them 25 cases of albuminuria, and 102 cases of opacity of one or both lenses. Of the 102 cataractous individuals, only 13 had albuminuria. His observations on these persons coincides essentially with those of Bamberger. In addition, Becker examined the notes of 1,443 patients over 35 years of age in the Medical Clinique at Heidelberg, and found in them an increased per-centage of albumen as life advanced, *e.g.*, between the ages of 35 and 50, twenty-three per cent. had albumen in the urine, while over 50 years of age the per-centage was 38. In 218 cases of *post-mortem* examinations, made at the Heidelberg Pathological Institution, upon persons over 35, only 33 possessed normal kidneys.

From all these facts Prof. Becker concludes that no casual nexus exists between the occurrence of cataract and nephritis. Moreover, if Deutschmann's views be correct, lental opacity would frequently be present along with albuminuric retinitis, and this the author has found not to be the case.

Dr. Horstmann (Berlin) read a paper on *The State of the Refraction in children under six years of age*. [The Reporters are obliged to postpone the abstract of this paper until a future number of the Review.]

Dr. Hock (Vienna) read a paper on *Peripheral Neuritis*. The cases of the affection he described were characterised by violent pain on movement of the eyeball and limitation of the

field of vision. The defects of the field differed according to the distance of the inflammation behind the globe, and according to the side of the nerve affected. These differences are easily explained by the later views of the course of the fibres in the optic nerve.

Dr. Noyes (New York) described an operation he had performed for the *Removal of a Lens Traumatically Dislocated from the Vitreous Humour*. The patient was laid in the prone position, with his head over the edge of the table in a dark room. Light was reflected from a gas jet overhead into the eye by means of a toilette mirror placed upon the floor, and was concentrated upon the eye by a large lens of 7 in. focal length. The crystalline lens having fallen forward into the pupil, chloroform was given, and then Noyes passed a specially prepared needle of one inch curvature into the sclerotic 6 mm. behind the cornea, and pressed the lens against the latter. The patient was then placed carefully on his back, and the lens was removed through a large incision in the cornea made with a Graefe's knife. The iris having been, during the proceeding, much contused and retroverted, Noyes passed in a hook, drew out the retroverted portion and cut it off. No vitreous was lost during the whole procedure. The wound healed rapidly, and in a few weeks the patient was able to return to work, with normal tension and good perception of light. As the operation was only undertaken as a substitute for enucleation, more could not have been looked for in the case.

In the discussion, Arlt, Kuhnt, Meyer, Krüger, Hock, and Mayerhofen related somewhat similar cases, where they had used the prone position, with or without a fixation needle and eserine, to facilitate the extraction of dislocated lenses.

Dr. Uhthoff read a paper on *A New Method for determining the Angle  $\alpha$*  which Professor Schoeler had indicated, and which the author had worked out in Helmholtz's physical laboratory at Berlin. It depends on the parallax produced by a bit of thick plate glass, when an object is looked at obliquely through the latter. This parallax disappears when the plate is looked through perpendicularly. By this method the angle between the visual line and the line which passes perpen-

dicularly through the centre of the cornea is ascertained. The method must, therefore, give similar results to those found by Donder's method by aid of the ophthalmometer, and Uhthoff found that this in fact was the case in all those persons he examined. He ascertained the centre of the cornea by a simple means suggested to him by Professor Helmholtz. The advantage of this method of ascertaining the angle between the visual line and the central line of the cornea is, that the ophthalmometer is not necessary, and that the angle is directly determined as it lies with its apex in the principal nodal point of the eye.

Dr. Mayweg (Hagen) made a communication on the *Use of Iodoform in the Treatment of Croupous and Diphtheritic Conjunctivitis*. The former disease he holds to be not local, but strumous in its nature, while diphtheritic conjunctivitis he regards as an infectious disease (*Infectionskrankheit*), inasmuch as he had noted well-marked so-called diphtheritic paralysis after its occurrence. He had never failed to save the eyes in both these diseases by the use of iodoform, provided the treatment was commenced before the cornea became affected. He opens the lids, and, after thorough cleansing, fills the conjunctival sac with powdered iodoform, and then applies a pressure bandage.

Prof. Sattler (Erlangen) denied the existence of any connection between croupous conjunctivitis and struma, but agreed with the author in not believing it to be infectious.

Dr. Meyhöfer (Görlitz) had found iodoform absolutely useless in some cases of diphtheritic ophthalmia even when used before the cornea became affected.

Dr. Mayweg, in reply, believed that failure could only arise from the use of an inferior preparation of iodoform.

Dr. von Hoffmann (Baden Baden) made a communication upon the *Connection between Throat Affections and Asthenopia*. In 25 asthenopic individuals he had cured the asthenopia by treatment directed solely to the state of the throat. The tonsils were ulcerated, and the treatment consisted in tearing the ulcers open with a blunt strabismus hook and applying suitable remedies.

Arlt and Ed. Meyer had observed similar cases of asthenopic troubles after throat affections, which were not diphtheritic.

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CASE OF PROPTOSIS FROM THROMBOSIS  
OF THE CAVERNOUS SINUSES;  
ANEURISMS OF THE INTERNAL CAROTID  
AND BASILAR ARTERIES  
FROM SUPPURATIVE PERIARTERITIS;  
DEATH; POST-MORTEM APPEARANCES.

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The following case occurring in the practice of a general surgeon presented pathological features of especial interest from the ophthalmic point of view:—

J. C., a boy aged 10 years, was admitted into the Queen's Hospital on September 26th, 1883, on account of uncontrollable epistaxis. Three days before admission a school-fellow had struck him about the skull with a ruler, and had bumped his head several times on the ground. So far as could be ascertained he did not lose consciousness at the time. His nose bled freely, and for this he was taken to a medical man, who adopted simple means to check it, but without success. On the day of admission, the bleeding still going on, a strong solution of perchloride of iron was injected into the nasal cavity, and this proving useless he was sent to the hospital.

On admission the bleeding was only very slight. The boy was conscious, but appeared to be very ill. His head and face were swollen and abraded in places, his nose and eyelids, particularly the right, being most affected. He was put to bed with cold evaporating lotions to his head, and a calomel purge at once prescribed.

On the following day he had marked loss of power in left upper limb; free discharge of watery fluid from left ear, and of dirty-coloured fluid from nose; had passed urine in bed; lay in a lethargic state and could only be made to understand what was said to him with difficulty; occasionally started up in bed complaining of pain in his head. Evening temperature,  $101^{\circ}2$ . Pulse, 100.



October 5th.—Has become much worse; his stupor being deeper and his pain more severe. He is very irritable when disturbed. Took milk freely. Temperature has varied between  $99^{\circ}$  and  $102^{\circ}$  F.

October 9th.—Has vomited occasionally; delirious at times; has lost flesh rapidly; slight epistaxis has occurred; involuntary micturition and defecation. Paralysis of left arm remains. Right eye is pushed forwards nearly half an inch. This symptom has come on during the last two or three days. So far as can be ascertained movements of globe are perfect. Pupils were equal and moderately dilated. No pulsation. No edema or discolouration of eyelids. Temperature,  $103^{\circ}$ .

October 19th.—Eye remained prominent for several days, when it began to recede, and has now sunk back into the orbit to its normal level. Has had several convulsions to-day for first time; has vomited occasionally since last report; headache has been more intense, and he has screamed loudly and frequently. To-day he is completely unconscious. No rigors throughout the whole illness. Temperature,  $100^{\circ}$ .

His unconsciousness continued until the 23rd, when he gradually sank and died.

*Post-mortem examination*, twenty-six hours after death. The scalp, skull cap, and outside of dura mater appeared normal. There were several small patches of purulent lymph over left parietal lobe of brain. The superficial veins over the convolutions of the right side in the neighbourhood of the sylvian fissure were injected. The superior temporo-sphenoidal and the inferior parietal and frontal convolutions were abnormally soft. On removing the brain the subarachnoid space was found full of recently coagulated blood. It covered the optic chiasma, base of third ventricle and corpora albicantes, crura, pons, medulla, and spinal cord for a short distance. The fourth ventricle was full of blood, which ran also through the *iter* to the third ventricle, completely filling this cavity. The lateral ventricles contained small blood clots, and were distended with blood-stained serum. On examining the base of the skull there was found a separation between the temporary cartilage, between the basilar portion of the occipital and the sphenoid bones. The cartilage was soft and red and bathed in purulent fluid. The body of the sphenoid and the posterior clinoid

processes were dark red and softened; cancellous spaces choked with thick, mulberry-coloured, pasty material; overlying dura mater was separated from bone; osseous surfaces rough and wormeaten. Cavernous sinuses of both sides blocked with thrombi, firm, fibrinous and red; breaking down in parts. Opposite the sphenoido-occipital synchondrosis was a ragged ulcer leading into roof of pharynx. Purulent mucus was found in the sphenoidal sinuses and also in the right antrum. Both orbits were examined and nothing abnormal was observed.

A careful dissection and examination of the arteries in the base of the skull showed the following:—The basilar was adherent, near its division, to the underlying dura mater by a distinctly sacculated aneurism—6 mm. in diameter and 4 mm. in depth. On removing the brain this aneurism was torn into two halves, one remaining attached to dura mater and the other to the artery. It contained fibrinous clots and communicated with the vessel through a smooth round mouth 2 mm. in diameter. The vessel in neighbourhood of aneurism was surrounded by a thin layer of purulent lymph. The intracranial portion of the right internal carotid had three aneurismal swellings. The first at the upper and inner part of the artery at the point where the vessel makes its first curve. It was sacculated, 5 mm. in long diameter, 3 mm. wide, and 3 mm. deep. The opening was circular, with a smooth rounded margin, and measured 1 mm. in diameter. It contained fibrous coagula, from which a delicate thrombus extended for some distance into vessel. The second was 6 mm. further on—vessel of normal size intervening. It was situated on the lower aspect of the artery where it makes its second curve, and was globular in shape, with a diameter of 3 mm. It, too, was sacculated, its mouth being round with smooth edges, and 1 mm. in diameter. The cavity contained thrombi which extended in thread-like form into the artery, backwards to first aneurism and forwards for a shorter distance. A third aneurism was found just below the anterior clinoid process, possibly at the origin of the ophthalmic artery, and was by far the largest of all. It was placed like all the others on the convexity of a curve in the vessel, and looked like the heart of a small bird, being 19 mm. long and 10 mm. in diameter. Its mouth was circular, with smooth and rounded edges, and measured 3 mm. across.

It was two-thirds full of firm, fibrinous, laminated clot, which was adherent to the sac. This clot was paler in colour at its outer part. There was a thin layer of purulent lymph around the artery from the circle of Willis to the carotid canal. The left internal carotid was healthy up to its first curvature, where its walls were slightly reddened, and there was a trifling dilatation at the prominence of the lower curve and another below the anterior clinoid process, exactly corresponding in position to the aneurism on the opposite vessel. Purulent lymph was found in the outer coat of the artery as it lay in the cavernous sinus.

The lungs were full of the characteristic abscesses so often found after death when suppuration has occurred in the bones of the skull or in its cavity. They were small and distinct collections of pus, bounded by thin and delicate walls having no naked eye resemblance to granulation tissue. Right pleura contained a small quantity of pus. Heart, liver, kidneys, and spleen healthy. Extensive post-mortem softening of stomach and left side of diaphragm which had allowed stomach contents to escape into left pleura. Microscopic sections of one of the vessels presented the following appearances: The adventitia was thickened and permeated by small round cells. This thickening was greatest in the neighbourhood of the aneurism, and was continuous with a similar layer outside the sac. The muscular coat disappeared at the mouth of the aneurism after its fibres had become soddened, separated from each other and slightly thickened. Cell infiltration in this layer was in small amount. The inner elastic layer could be traced from the vessel round the mouth into the aneurismal walls. Inside the vessel was a layer of thrombus adherent to its wall and continuous through the opening with the thrombus in the cavity of the aneurism. The part of the thrombus lying near the mouth of the aneurisms formed a reticulated structure almost free from cells, as if the latter had been washed away by the blood current. There were several dark granular patches in the substance of the clots. All the vessels examined presented similar appearances. Micrococci tubercles were not examined for.

*Remarks.*—The history of the case read by the light of post-mortem appearances I take to be somewhat as

follows:—Primarily a separation, rather than fracture, of the sphenoid and occipital bones at their basilar articulation, the injury being probably compound through a tear in the roof of the pharynx. Secondly, osteo-myelitis of the body of the sphenoid, and consequent implication of the structures immediately in contact with it—viz., over its upper surface, the dura mater lying upon the basilar process and the fibrous structure forming the floor of the cavernous sinuses. This phlebitis by continuity would give rise to thrombosis of blood contained in the spaces. The inflammatory process extended from here forwards to the sphenoidal sinuses and to the right antrum of Highmore; it implicated also the loose connective tissue layer forming the outer coats of the large cerebral vessels—viz., the basilar where it lies on the sphenoid bone, and the internal carotids where they also lie upon this bone along the inner walls of the cavernous sinuses. All these areas of inflammation would have suppurative tendencies, originating as they did in a suppurative focus and would constitute really a suppurative periarteritis. The vessels thus softened chiefly in their outer and middle tissues, yielding to the force of the blood at the points of greatest pressure, *i.e.*, at the outer or convex sides of curves, allowed the inner coat to bulge through the softened wall so as to form sacculated aneurismal dilations. The larger aneurism in the right internal carotid—the one to which I referred above as *possibly* the ophthalmic—burst just at the point where the vessel enters the sac of the arachnoid, blood being extravasated therefrom along the base of the brain forwards to the optic chiasm backwards to the fourth ventricle, which it entered through the foramen of Majendie. After filling this space the clot extended forward through the iter a tertio ad quartum ventriculum, to the third ventricle, disturbing this cavity and passing on through the foramen of Monroe into the lateral ventricles. Death resulted from coma.

The points worthy of attention here are, first, the cause and nature of the proptosis ; and second, the pathological origin of the aneurisms. A proptosis coming on under the circumstances detailed above is likely to be regarded either as being due to orbital cellulitis or to one of the varieties of orbital aneurismal tumours, most likely aneurismal-varix, from communication between the internal carotid artery and the cavernous sinus. From the fact that the proptosis appeared rapidly in two or three days, and at a period remote from time of accident—about thirteen days afterwards—that there was no pulsation, thrill, or venous engorgement to be observed, an opinion was formed that it might be due to pus at the back of the orbit, either originating there or passing thither from within the skull. This latter idea was strengthened by the presence of high temperature, headache, and vomiting. I regret that the optic discs were not examined. The absence of chemosis, redness, and even the slightest œdema of the lids, however, removed all suspicion of orbital suppuration in the course of a day or two without resort being had even to exploratory puncture. The true explanation of the exophthalmos was found post mortem in the fact that the cavernous sinus was full of thrombus ; the blood flow from the orbit being thus obstructed, the engorgement of the post-ocular vessels pushed the globe forwards. The aneurisms probably had no direct bearing on the development of the exophthalmos. On the subject of intracranial aneurisms in their relation to exophthalmos, Sattler (*Graefe and Saemisch Handbook*, vol. 6, p. 87) says that intracranial aneurism of the ophthalmic artery is one of the rarest causes of exophthalmos, producing it only when of rapid formation as by the bursting of the intima in an already weakened vessel. He states with certainty that when such an intracranial aneurism is formed gradually it may completely compress the ophthalmic vein and cavernous sinus without bringing about signs of venous obstruction and pulsation in the

orbit. In no case hitherto recorded of aneurism either of this artery or of the internal carotid in which a post-mortem examination was made were there signs of venous obstruction, proptosis, or pulsating swellings in the orbit, although in several cases the aneurismal swelling completely obstructed the cavernous sinus. The explanation is, that the gradual formation of the tumour permits the development of collateral circulation. The plugging of the right cavernous sinus was rather rapid in this case ; hence the proptosis. The left sinus still had a passage through it although it contained thrombus ; this explains why there was no bulging of the left eye. The recession of the affected globe occurred, I suppose, when collateral venous channels had become established.

Every surgeon of practical experience must often have been surprised at the immunity from disease enjoyed by arterial trunks situated in the midst of acute inflammations, a freedom more providential than any other with which I am pathologically acquainted. But that arteries so circumstanced do become involved in the inflammatory process is within the experience of most of us. Secondary hæmorrhage may in this way very often be explained. A discussion at a meeting of the Société de Chirurgie of Paris in October, 1882, upon a paper by Humbert, "On ulceration of arteries by contact of pus—à propos of two cases observed in the course of acute osteomyelitis," is interesting in connection with the above. Scarlatina and septicæmia were considered predisposing causes, and the development of tubercles in the coats of the artery was suggested as an occasional explanation of such vascular softening. A case of fatal hæmorrhage from ulceration of the popliteal artery occurred in my own practice last year in a man whose knee-joint I had opened by lateral incisions for suppurative and fungous arthritis twelve days previously. Both lungs were found to be full of tubercles. The vessel was not examined microscopically. I wish to point out that there were at least four distinctly saccu-



lated aneurisms in the above case—three on the right internal carotid and one on the basilar artery, and that the outer and middle coats had given way and allowed the inner elastic layer to protrude through them like the sac of a hernia. Mere dilatation of arteries from inflammatory softening of their walls has been many times described. Mr. Symonds showed such a case at the Pathological Society, in December, 1883, which is thus described in the *British Medical Journal*:—"Radial artery surrounded by sloughing tissue and dilated at two points into aneurismal pouches, partly filled with coagula. Wall of one of the pouches was perforated. Interosseous artery also dilated at one spot. Microscopically, accumulation of inflammatory products in middle coat." Dr. Goodhart pointed out that the inflammatory process attacked limited areas in the thickness of the vessels and thought that the aneurisms which occurred after embolism depended upon some form of arteritis, and also that the aneurisms which occurred after ligature were not solely the result of mechanical obstruction but were similarly due to arterial softening.

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1. TH. LEBER (Göttingen). The Action of Foreign Bodies in the Eyeball. *Transact. Internat. Med. Cong.*, London, 1881, *Sect. Ophthalmol.*, p. 15.
  2. E. LANDMANN (Göttingen). The Action of Aseptic Foreign Bodies in the Eyeball.
  3. E. FRANKE (Hamburg). Foreign Bodies in the Anterior Chamber and Iris. *Von Graefe's Archiv.* XXX., 1., p. 211, 1884.
  4. TH. LEBER (Göttingen). The Action of Metallic Foreign Bodies in the Eyeball. *Von Graefe's Archiv.* XXX., 1., p. 243, 1884.

The important paper read by Prof. Leber at the International Medical Congress in London in 1881 has been the first of a series of observations upon the action of septic and aseptic

foreign bodies inserted into the eyeball. In that paper Leber drew attention to the fact, clinically familiar in the results of accidents and of operations such as Wecker's "Drainage of the eye," that foreign bodies of a chemically stable character, *i.e.*, not acted upon by the blood and tissues, may remain for years in the eyeball without setting up inflammatory mischief. He had corroborated the clinical evidence by experiments upon rabbits, into whose aqueous and vitreous chambers he introduced fragments of gold and glass without producing any inflammatory changes whatsoever.

He also investigated the effects of the introduction of aseptic foreign bodies not chemically indifferent, such as the oxidisable metals, iron, steel, copper, &c. These when introduced into the anterior chamber produced no very considerable disturbance. Needles in the anterior chamber of rabbits' eyes gradually oxidised, but remained for months or years without injury to the organ. The same fact has for long been observed with regard to the human crystalline lens. Pieces of metal have been embedded in it for years without other result than the formation of a cataract.

The introduction of oxidisable foreign bodies into the vitreous produces, however, considerable and serious effects. As the substance oxidises the surrounding vitreous becomes clouded with the chemical products of the change, and in a few days the retina is detached from the choroid, and in places exhibits signs of perforation (*vide* O. R., vol. 1., p. 405). Microscopically an acute atrophy of the retina is demonstrable. The rods are lengthened, growing into the pigmentary layer, the cells of which are enlarged to a considerable extent, and corresponding changes are observed in the external nuclear layer. These changes he attributed entirely to the chemical action of the foreign body, for when the necessary antiseptic precautions were not adopted in introducing it, purulent inflammation was a common occurrence, and he was able to demonstrate in the suppurating vitreous the presence of countless numbers of minute microbes exhibiting vital movements.

Leber explained the action of these microbes as being of a chemical nature. The organisms, he argued, produce by their growth and development certain substances which act as inflammatory stimuli to the neighbouring tissues; he considered this

view to be substantiated by the experimental production of purulent inflammation in the eyeball by the injection of septic fluids in which all micro-organisms had been destroyed by boiling or by other methods. In such cases the inflammation subsides after a time, because the living seeds are wanting, whose growth reproduces the material which is the efficient agent in the causation of the inflammation. He attributed the occurrence of purulent inflammation in cases of cysticercus cellulosaë to the formation of some inflammation-producing substance, for in these cases neither microbes nor mechanical action are sufficient to explain the process.

Landmann, on Leber's suggestion, has collected and published a list of cases in which foreign bodies, presumably aseptic, were lodged in the eyeball.

A. Chemically indifferent foreign bodies in the anterior chamber and its neighbourhood: a grain of gunpowder, 1 case; a piece of porcelain, 1; a piece of wood, 1; a thorn, 3; cilia, 7; gold wire, 2; pieces of lead, 4; a piece of stone, 5; piece of glass, 3. In all these cases, although there may have been considerable inflammatory reaction from the original injury, the continued presence of the foreign body failed to excite suppuration or the loss of the eyeball.

Two cases are recorded where after many years—19 and 12 respectively—fragments of stone in the anterior chamber set up iritis, which was cured by iridectomy in the one case, and by the removal of the fragment in the other.

Landmann asserts that in not one of the recorded cases of sympathetic ophthalmitis, caused by the presence of an old foreign body in an eye which had previously been perfectly free from irritation, is there a clear proof that the alleged inflammation was really sympathetic.

B. Chemically indifferent foreign bodies in the vitreous chamber and its surrounding tunics. Five cases are on record of the presence of pieces of lead in the vitreous, and all of these in Landmann's opinion substantiate the view that chemically indifferent foreign bodies can remain in the globe without setting up inflammation. In three of the cases it must be remarked that extensive opacities were present in the vitreous, and in two of these atropic changes had also taken

place in the choroid. One case is recorded of the presence of a piece of stone (?) in the vitreous without the occurrence of any inflammatory reaction.

Franke has collected all the published cases of foreign bodies in the iris or anterior chamber uncomplicated by other injuries to the eyeball, and classified them according to the nature of the foreign body. He acknowledges that his list is far from being exhaustive, but the number is large enough to draw conclusions from—56 cases of foreign bodies in the anterior chamber, and 69 of foreign bodies in the iris.

Iron and steel.

In the anterior chamber ... 8 cases.

In the iris ... 30 „

Copper.

In the anterior chamber ... 9 „

In the iris ... 19 „

Stone.

In the anterior chamber ... 10 „

In the iris ... 7 „

Cilia.

In the anterior chamber or iris ... 21 „

Wood and thorns.

In the anterior chamber ... 2 „

In the iris ... 4 „

Glass and porcelain.

In the anterior chamber ... 3 „

In the iris ... 1 „

Gunpowder.

In the anterior chamber or iris ... 3 „

Knot of a whip ... 1 „

Various foreign bodies of unknown nature 7 „

He finds that foreign bodies in the iris produce in general more irritation than those in the anterior chamber, and that metallic substances are more irritating than glass or cilia, fragments of stone occupying an intermediate place in the scale. The general results of an examination of the cases are fully in accordance with Leber's experiments upon animals, and Franke thinks himself justified in the assertion that such a thing as inflammation from purely mechanical irritation does

not occur; at the same time he cannot deny that some connection exists between the presence of a foreign body and subsequent inflammations. The prognosis as regards the preservation of the form of the globe and of vision is not, however, very favourable, and the dangers of sympathetic complications can never be disregarded. Consequently the earliest possible removal of the foreign body should always be undertaken.

Leber returns to the subject of foreign bodies in the eyeball, in a paper published as an appendix to Franke's article. As regards the chemically indifferent bodies, he holds that his former opinion is established, viz. :—that the inflammation after their entrance is not due to the bodies themselves but to complications such as septic infection. He does not feel himself justified in accounting for the inflammation that so frequently follows the entrance of iron, steel, and copper by the same simple hypothesis, especially as experiment has shown that perfectly aseptic copper can produce purulent inflammation. He has kept a piece of iron for 527 days in the anterior chamber without an evil result, inflammatory or other, but a similar sized piece of copper nearly always produced considerable inflammation, accompanied by suppuration located in the immediate neighbourhood of the foreign body, and never shewing any tendency to extend to neighbouring tissues as infective inflammation does. If the suppuration terminated either in spontaneous expulsion of the foreign body, or in an incapsulation of the copper, a satisfactory healing soon followed. Leber considers that the peculiarity of this process substantiates his theory that the inflammation is due to the chemical action of the copper and not to any accidental contamination with septic material. He has observed frequently after injecting numerous fine particles of copper that the pus which at first surrounded them became absorbed, and finally the little pieces of metal also became absorbed. He found that a piece of copper wire inserted into the lens so deeply as not to remain in contact with the cornea produced no inflammatory reaction.

Leber had the opportunity of examining the pus surrounding a piece of copper in the ciliary region of a human eye, and found that it was absolutely free from micro-organisms,

A similar negative result followed the examination of fibrine surrounding a splinter of iron in a human iris. Also in a case where purulent hyalitis followed the entrance of a piece of iron which lay embedded in the choroid, no micro-organisms could be detected, and injection of the pus into a rabbit's anterior chamber produced no inflammation. Again, no organisms could be detected in a case when hypopyon followed the impaction of a piece of iron in the cornea itself. These cases appear to justify Leber's view that iron and steel can excite purulent inflammation by their chemical action alone without the supervention of any septic infection. Leber adds the records of two cases where iron had been impacted in the crystalline lens without producing any inflammatory reaction. In one of these the iron was deeply situated, but in the other it projected through the capsule into the anterior chamber.

**J. WIGGLESWORTH and T. H. BICKERTON.** On the Condition of the Fundus Oculi in Insane Individuals. *Brain, Parts XV. and XVI.*, 1884.

The investigation recorded in this paper was conducted in the Rainhill Asylum; it extended over a period of two and a half years, and embraced all varieties of mental disorder. In a few cases ophthalmoscopic examination was either impossible or so difficult as to yield no trustworthy results; all such cases are excluded from the record. The "indirect" examination was in almost every case supplemented by the "direct;" errors of refraction were noted when present, and the acuity of vision was tested whenever possible. It was not considered possible to obtain trustworthy information as to the field of vision.

The persons satisfactorily examined were 313; of these, 66 were General Paralytics, and 247 Non-Paralytics. Among the Non-Paralytics (mania, 82 cases; melancholia, 49; mental stupor, 2; dementia, 61; epilepsy, 48; imbecility without epilepsy, 5) the optic discs and main retinal vessels were perfectly normal in 83 per cent., and among the remaining 17 per cent. the changes were in some cases doubtful and in some others were clearly due to causes, such as Bright's disease, which had no direct connection with the patient's lunacy.



Among the General Paralytics decided changes were present in 23 per cent., and if to these cases be added a few more in which the existence of change was doubtful, the percentage rises to 35.

In general terms the results show a much less frequent connection between insanity and retinal changes than other observers have asserted to exist. The authors endorse the statement made by Gowers that consistently with health "the tint of the optic discs may vary as much as the tint of the cheek," and believe that mere physiological variations, including the "physiological cup," must have sometimes done duty for pathological changes in previous statistics. They formulate the following conclusions :—

1. That in Insanity proper (including all forms *other than General Paralysis*) changes in the fundus oculi are found in a small minority of cases ; but that when allowance is made for changes depending upon associated constitutional conditions, errors of refraction, &c., the number of cases in which a connection between the mental (cerebral) state, and the accompanying change in the fundus oculi, can be so much as suspected, is very small.

And as a corollary from this,

2. That in Insanity proper no connection can be traced between the condition of the fundus oculi and the patient's mental state.

3. That in the majority of cases of "General Paralysis of the Insane," the fundus oculi presents a perfectly healthy appearance.

4. That in a minority of cases clear and precise lesions are found.

5. That these lesions fall into two main classes, the one tending in the direction of slight neuritis, the other in that of atrophy.

6. That in the former class the affection declares itself as a hyperæmia of the discs, the edges being softened and indistinct, so that in some cases they can be traced with difficulty or not at all ; and that these conditions tend—if the patient live long enough—to be replaced by atrophy, so that at length complete disorganisation of the nerve may take place. The changes are essentially chronic in their course.

7. That though atrophy of the optic nerves may thus succeed to a slight chronic interstitial neuritis, it is also not unfrequently primary *at the disc*; the atrophy may be complete, the patient becoming quite blind.

8. That the pathological basis underlying the appearances of slight neuritis may be broadly characterised as a tendency to overgrowth in the connective elements of the nerve; the trabeculæ not only getting greatly hypertrophied, but the neuroglia corpuscles also becoming very large and numerous; these parts thus grow at the expense of the nervous elements, which subsequently atrophy.

9. That in the cases of primary atrophy, the pathological appearances eventually reached, though somewhat similar, may possibly take place in the reverse order *at the disc*; the nerve fibres being the first to dwindle, and the fibrous elements—trabeculæ, &c., subsequently taking on increased growth.

10. That in a considerable proportion of the cases in which atrophy of the optic discs is met with, spinal symptoms are prominent in the disease, these symptoms pointing in the direction of posterior or lateral sclerosis of the cord; but that this connection is by no means invariable.

It is noteworthy that among the 313 insane persons examined, having an average age of 55 years, 43, *i.e.*, 13·7 per cent., presented opacities of the lens, slight or considerable. The authors, assuming that this is a much higher percentage than would be found in the population at large of the same average age, point to it as an illustration of the general impairment of nutrition common in the insane.

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L. de Wecker (Paris). An Operation for Strabismus by Advancement of the Capsule. *Archives d'Ophth.* May, June, 1884, p. 281.

The treatment of strabismus at present consists essentially of two methods, the one by which the tendon of a too powerful muscle is caused to recede in relation to the cornea; the other in which that of a too feeble muscle is advanced in the same direction. The means of controlling and regulating the effect of these operations depends upon the fact that the muscles possess two attachments to the globe,—the one *direct*,

the insertion of the tendon into the sclerotic, the other indirect, the attachment of the muscle to the fibrous capsule which it traverses to reach the sclerotic. Thanks to the arrangement of the muscle in relation to Tenon's capsule, the simple detachment of the tendon at its insertion into the globe does not permit it to recede into the orbit, and diminishes its action upon the globe only to a moderate extent. In certain forms of strabismus, in which it is necessary to increase the action of a muscle, and especially in those cases of insufficiency known as latent strabismus, De Wecker proposes a third method of operating, viz., by dealing with the indirect capsular attachment of the muscle instead of with its attachment to the globe, the principle being to shorten the muscle by doubling or folding it at this point, and thus to increase its efficiency.

By such a proceeding he hopes to gain the following advantages:—(1.) To pursue a strictly conservative principle, increasing force rather than diminishing it. (2.) To avoid with certainty the misfortune of over-correction, such as occurs when a muscle enfeebled by operation becomes in course of time insufficient for its work. (3.) To avoid those disfiguring changes at the canthus which occasionally follow tenotomy, and which destroy to a great extent its cosmetic advantages, even though the position of the eye may be perfect.

He practises the operation in the following manner:—A crescent of the conjunctiva, 5 mm. broad and 10 mm. high, is excised over the tendon of the muscle, the crescent being so placed that its concavity is towards the cornea, and that its middle corresponds with the tendinous insertion of the muscle. This being done, the conjunctiva retracts strongly so as to expose largely the edges of the muscle and the capsule of Tenon. The capsule is then incised near to the insertion of the muscle and separated from it above and laterally. This separation being effected, the capsule is sutured and drawn forward by two threads passing near to the upper and lower margin of the cornea. The capsule sliding forward in this manner reattaches itself nearer to the cornea than before, and thus the desired effect is obtained. The incision and the separation of the capsule are indispensable; the amount of effect produced depends upon the degree of separation, and the larger or smaller extent to which the capsule is included in the suture.

H. R. SWANZY (Dublin). *Handbook of Diseases of the Eye.* London: H. K. Lewis, 1884.

This handbook is, in our opinion, an admirable one. Within the space of about four hundred pages the author has contrived to deal with his subject in a very thorough and at the same time in a very readable style. He gives little prominence to his own individual opinions and methods of practice, but there is throughout a clearness of detail, especially in regard to treatment, therapeutic as well as operative, which denotes the surgeon of wide experience, and which will certainly make the book a favourite. Ample references are given to recent ophthalmic literature. The book is capitally illustrated and well printed. A feature which requires special notice is the chapter "On the Motions of the Pupil in Health and Disease," a concise exposition of this important subject such as is not to be found elsewhere in English medical literature. From the second portion of this chapter we take the following passages, with some abbreviation, and omitting reference to the writers whose opinions they express:—

THE SIZE OF THE PUPIL IN DISEASE.—*Myosis* may be caused by irritation of the pupil-contracting centre or fibres, or by paralysis of the pupil-dilating centre or fibres, or by a combination of both. Either cause alone produces a medium myosis, a combination of the two a maximum myosis.

Irritation Myosis is not usually increased by the stimulus of light, nor on convergence of the visual axes, nor does it diminish in the shade. Mydriatics dilate such a pupil widely, myotics contract it ad maximum. In paralytic myosis the pupil reacts well to light and on convergence, but does not dilate on application of sensitive or psychological stimuli, or with co-ordinated motions. Mydriatics dilate such a pupil only partially, while myotics contract it ad maximum. In maximum myosis every reaction is wanting, strong mydriatics alone producing a medium dilatation.

Irritation Myosis is found in:—*a.* The early stages, at least, of all inflammatory affections of the brain and its meninges, in simple, tubercular, and cerebro-spinal meningitis. When in these diseases the medium-myosis gives place to mydriasis, the change is a serious prognostic sign, indicating the stage of

depression with paralysis of the third nerve. *b.* In cerebral apoplexy the pupil is at first contracted, and this contraction is a diagnostic sign between apoplexy and embolism, in which latter the pupil is unaltered. *c.* In the early stages of intracranial tumours situated at the origin of the third nerve or in its course. *d.* At the beginning of an hysterical or of an epileptic attack. *e.* In tobacco amblyopia, probably from stimulation of the pupil-contracting centre by the nicotine. *f.* In persons following certain trades, as the result of long-maintained effort of accommodation (watchmakers, jewellers, &c.), the pupil-contracting centre being subject to an almost constant stimulus. *g.* As a reflex action in ciliary neurosis; consequently, in many diseased conditions of those parts of the eye supplied by the fifth nerve.

Paralytic Myosis occurs:—In spinal lesions above the dorsal vertebræ, *e.g.*, injuries, and inflammations, especially of the chronic form. In the simple form of this myosis the pupil has but a medium contraction, and reacts both to light and on convergence. This condition is found in the early stages alone, when the disease has attacked only the cilio-spinal centre, or higher up as far as the medulla oblongata; later on, when Meynert's fibres become engaged, we have the Argyll Robertson pupil. The pupil, although contracted and responding to light but slightly or not at all, contracts on convergence of the visual axes (or accommodation). The very minute pupil often seen in tabes dorsalis is probably due to secondary contraction of the sphincter pupillæ. The myosis and the motor phenomenon are not directly connected; for it sometimes happens that pupils which do not react to light and do contract on convergence are not habitually contracted, and may even be somewhat dilated. The myosis is a sign, and an important one, of disease of the posterior columns, while the defective reaction to light with retained contraction on convergence indicates disease at some distance from the spinal cord, namely, in Meynert's fibres. Paralytic myosis is also found in general paralysis of the insane. In acute mania the pupil is usually much dilated, and when this mydriasis is changed for myosis, approaching general paralysis may be prognosticated. Myosis, following on irritation mydriasis, is also found in myelitis of the cervical portion of the cord. In bulbar paralysis, if paralytic myosis

occurs, the disease is probably complicated with progressive muscular atrophy, or with sclerosis of the brain and spinal cord.

A contracted pupil also occurs in alcoholic amblyopia, due probably to an affection of the medulla oblongata, possibly fatty degeneration. Myosis may also be due to paralysis of the cervical sympathetic, which may result from injury, from pressure of an aneurysm of the carotid, innominate, or aorta, or from pressure of enlarged lymphatic glands. In apoplexy of the pons varolii myosis is present, but it is not yet certain whether it is an irritation myosis or a paralytic myosis.

*Mydriasis* may be caused by irritation of the pupil-dilating centre or fibres, or by paralysis of the pupil-contracting centre or fibres.

Irritation (or Spasmodic) Mydriasis is characterised by a moderately dilated pupil, contracting somewhat to light and on convergence, but not dilating on sensitive or psychical stimuli, easily dilated ad maximum by mydriatics, but with difficulty contracted ad maximum by myotics. Paralytic mydriasis exhibits a moderately dilated pupil, reacting to sensitive and psychical stimuli. The reaction to light and on convergence varies according to the seat of the lesion. If the latter lie between the iris and pupil-contracting centre, the direct and consensual reaction to light is wanting, as also the associated motion on convergence of the visual lines. But if the lesion lie between the retina and the pupil-contracting centre, the direct contraction to light is wanting, but the consensual contraction and that on convergence retained. In either case the pupil can be contracted ad maximum by mydriatics, but not contracted more than to medium size by myotics.

Irritation of the pupil-dilating centre and paralysis of the pupil-contracting centre existing simultaneously, give rise to maximum mydriasis. In it there is absolute immobility to stimuli of all kinds except strong myotics, which may bring it back to the normal size.

Irritation Mydriasis occurs:—*a.* In hyperæmia of the cervical portion of the spinal cord, and in spinal meningitis. *b.* In the early stages of new growths in the cervical portion of the cord. *c.* In cases of intracranial tumour and other



diseases causing high intracranial pressure, although these may also give rise to paralytic mydriasis. *d.* In the spinal irritation of chlorotic or anæmic people, after severe illness, &c. *e.* As a premonitory sign of tabes dorsalis. *f.* In cases of intestinal worms, owing to the stimulation of the sensitive nerves of the bowel, and sometimes in other forms of intestinal irritation. *g.* In psychical excitement, *e.g.*, acute mania, melancholia, progressive paralysis of the insane (often then unilateral, with myosis in the other eye).

Paralytic Mydriasis may be due either to a paralysis of the pupil-contracting centre, or as the result of the stimulus not being conducted from the retina to that centre. It may be found under the former circumstances:—*a.* Sometimes in progressive paralysis where at first there was myosis. *b.* In various diseased processes at the base of the brain affecting the centre of the third nerve. *c.* In a later stage of thrombosis of the cavernous sinus. *d.* In orbital processes which cause pressure on the ciliary nerves. *e.* In glaucoma. *f.* In cases of intraocular tumours which have attained a certain size.

In paralytic mydriasis due to non-transmission of the stimulus of light to a healthy pupil-contracting centre and nerves, contraction of the pupil will take place only on convergence of the visual lines. The same condition of pupil will be found if the lesion lie in the course of Meynert's fibres, although vision may be normal. If the lesion lie in the centre of vision (angular gyrus, &c.), or in the course of the fibres connecting this centre with the corpora quadrigemina, although absolute blindness exist, the reaction of the pupil to light will be perfect. Paralytic mydriasis due to non-conduction of light-stimulus is found in most cases of optic atrophy.

## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, OCTOBER 9TH, 1884.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

*Transactions.*—The President announced that the new volume of the *Transactions* had been laid upon the table, and that copies would shortly be distributed.

*Prevention of Blindness.*—The Secretary (Dr. Brailey) read a letter which had been received from Mr. R. G. Hamilton, stating that in pursuance of the resolution passed by the Society on June 5th, 1884, and transmitted to him, a circular letter calling attention to the subject had been addressed by the Secretary of the Local Government Board for Ireland to the medical officer of each dispensary district, to the midwives of each district, and to the clerk of each union.

*Central Choroiditis with Good Vision.*—Mr. Nettleship showed a drawing of a case of central choroiditis, with almost perfect acuteness of vision. The choroid over the whole of the yellow-spot region was superficially atrophied, and to a great extent covered by large densely-black patches of pigment. The retinal vessels were normal, and the optic disc healthy. There were a few detached patches of pigment beyond the yellow-spot region. Vision was  $\frac{20}{20}$  fairly, and 1 J. No scotoma could be made out, but the visual field was defective at the periphery. The appearances were those of superficial choroiditis, with great proliferation of the pigment-epithelium, and infiltration of some of the pigment into the retina. Such changes, involving the fossa centralis, might seem incompatible with such good vision. Two possible explanations were suggested: either that a slightly eccentric fixation had been acquired, or that the choroiditis had in reality occurred in the deepest layers of the choroid. But the fact that the pigment-masses lay in front of the large choroidal vessels was opposed to the latter view. The condition had probably been in existence for five years, the history pointing to the occurrence of an extravasation at that time. Mr. Nettleship referred to another case, which had been under Mr. Hutchinson's care at Moorfields, where vision was also remarkably good.

Dr. Angel Money mentioned a case of disease at the yellow-spot region with good vision, which had been under the care of Mr. Tweedy.

*Pseudoglioma: Death from Meningitis.*—Mr. Nettleship, in a previous paper, had drawn attention to the frequency with which attacks of destructive ophthalmitis, simulating glioma, coincide with some general illness, often presenting pyæmic symptoms. In the present case, the patient, a girl aged two years and a half, died of cerebro-spinal meningitis, secondary

to purulent otitis. The disease of the eye, which was purulent irido-cyclitis, with suppuration of the vitreous, was most probably pyæmic, as was also the meningitis. The case threw some light on the rare cases in which meningitis occurred after excision of an acutely inflamed eyeball; both occurrences might be set down as local pyæmia, or spreading phlebitis. If, however, pseudoglioma in children were really the result of a pyæmic process, it was necessary to assume that children recovered from pyæmia with considerable frequency. The previous history of the patient in this case was negative. She was taken ill on March 2nd, shivered, vomited, and had some diarrhœa. The eye was noticed to be inflamed on March 3rd, and she was brought to the hospital on March 5th, with purulent inflammation of the left cornea, and masses of semitransparent lymph blocking the pupil, and lying in flocculi in the anterior chamber. On the following day, the temperature ranged between  $102.2^{\circ}$  and  $103.6^{\circ}$ , and there was a small firm swelling over the head of the right fibula. On the following day, both knees were slightly swollen and tender; the lymph was disappearing from the pupil and the anterior chamber of the left eye; there was marked papillitis of the right eye. The left eye subsequently shrank rapidly, and the patient died of exhaustion six weeks after admission. The necropsy revealed no important lesions, except in the brain and spinal cord. The crura cerebri, optic tracts, and chiasma, the pons, and fore part of the cerebellum, were covered with thick yellowish-white lymph: the roof of the middle ear on the right side was yellowish and softened: the membrana tympani was softened and partially detached, and the middle ear and mastoid cells contained much thick pus. The whole posterior half of the cord, from the upper dorsal region downwards, was covered with yellowish lymph. No phlebitis could be demonstrated.

Dr. Anderson referred to the frequent occurrence of cerebral abscess in ear disease without any discoverable track between the two points.

*Amblyopia and Nervous Depression from the Vapour of Bisulphide of Carbon and Chloride of Sulphur.*—Mr. Nettleship.—In the manufacture of certain kinds of india-rubber the material is "cured" (vulcanised) by being passed through a bath consisting of bisulphide of carbon (thirty-two parts) and

chloride of sulphur (one part); a strong vapour arises during the process, and the work is believed, by the men, to be unhealthy. The speaker had recently met with a case of amblyopia in a young man, aged 20, who had been engaged in the "curing-house" for nine or ten months. After three or four months of the work his health began to fail; he felt great weakness in all his limbs, and a liability to nausea; for some weeks before admission he had severe headache, and about three weeks before admission his sight became, apparently, suddenly so bad that he could not see people on the pavement; vision grew worse, and when admitted vision was  $\frac{5}{70}$  with each eye, and 12J. He stated that he saw worst in bright daylight; the fields of vision were not curtailed. After admission, improvement commenced, and on the nineteenth day vision was  $\frac{20}{60}$  on the right, and  $\frac{17}{60}$  on the left; the optic discs pale and a filmy haze over them; the neighbouring retina showed the "watered silk" appearance. He returned to work in the India-rubber works, but not in the curing-house, on leaving the hospital on August 25th. On October 6th sight was a good deal improved (vision was  $\frac{20}{60}$  and 6J.); a large and ill-defined scotoma for red, a little to the outer side of the centre of each field; the scotomata quite symmetrical. The optic discs paler and clearer. He was well and strong, and more cheerful.

Professor Fuchs, of Liege, saw this case and communicated to Mr. Nettleship the notes of a similar one. The patient was a woman, aged 23; pale, thin, and weak: the muscles of the thenar eminence and the interossei muscles atrophied: sight very imperfect; right vision  $\frac{2}{60}$ , left  $\frac{4}{60}$ ; slight neuritis of each eye; the optic discs pale and hazy, but not swollen. The patient stated that since she began working with the bisulphide of carbon bath she had suffered from weakness of the limbs, coldness, formication, headache, giddiness, and loss of appetite. She was admitted into the hospital, and slowly improved under treatment with strychnine administered hypodermically. About eight weeks after admission, it was noted that there was a small well-defined central scotoma for red in each eye. Sixteen weeks after admission sight had much improved, vision was  $\frac{5}{18}$ . About seven months after admission, the scotoma had disappeared, and right vision was  $\frac{5}{12}$ , left  $\frac{5}{9}$ . Eight months and a half after admission, the optic discs were paler than normal, but

sharply defined; the atrophy of the interossei and thumb-muscles had disappeared; vision had improved; right vision  $\frac{5}{9}$ , left  $\frac{5}{6}$ . In a similar case recorded by Dr. Alexander Bruce, the man lost his sight rapidly after an unusually prolonged exposure to the fumes, but there had been previously, for some months, great nervous and muscular weakness; there were no ophthalmoscopic changes, and the patient entirely recovered in about four months. Dr. Bruce had also recorded two other cases of poisoning by bisulphide of carbon, in which the same weakness and depression were noticed, but not amblyopia. The cases were of interest as illustrating in a new way the peculiar liability of the optic nerves, as compared with other nerves of special sense, to be damaged by influences which depress the whole nervous system.

The President asked whether any inquiry had been made of the masters to ascertain whether they were aware of the injurious nature of the process of "curing" with bisulphide of carbon and chloride of sulphur.

Mr. Nettleship replied in the negative, and after some conversation, Messrs. Nettleship, Gunn, and Adams Frost were requested to act as a committee to make an investigation into the question.

*Remarks on three cases of Recent Detachment of the Retina.*—Dr. W. A. Brailey.—The first patient was a man aged 43. The eye was previously normal, judging from the history and from the condition of its fellow. A complete detachment of the retina had apparently occurred fourteen days earlier, during a severe fit of coughing. Gradually, perception of light returned, till, on admission, he could count fingers at a foot. When he presented himself six days later for treatment (scleral puncture), vision was  $\frac{6}{24}$ , and the field very much larger than before. Indeed, no detachment was now to be made out, but there were large opacities in the vitreous, especially near the seat of detachment. This improvement was maintained when last seen (three months later). The second patient was a boy aged 12. The retina was detached at its upper and outer part, probably after a blow from a stone three months earlier. The lower and inner part of the field was wanting, the defect passing the horizontal line above and the vertical meridian below. It just embraced the fixation-point. The retina so far reattached itself after treat-

ment (scleral puncture, rest, atropine, and jaborandi) that, except for some little peripheral limitation, corresponding to the seat of the previous detachment, the only absolutely blind part was a band or track extending directly inwards to the fixation-point, which it involved. This band corresponded to the lower edge of the detachment as first seen ophthalmoscopically; but that edge of the retina lay, when the patient was last seen, in a flat fold. Two weeks later, the improvement was still maintained. The third patient was a man aged 40. The defect first appeared six months before admission, when he was suffering from a violent cough. It gradually increased. The inner half of the field was wanting, the defect extending beyond the fixation-point and vertical meridian above, but not quite so far below. He was able only to count fingers at eight feet. After scleral puncture, atropine, jaborandi, and eight days in bed, the field was conspicuously enlarged, the fixation-point being now free. Vision was  $\frac{6}{60}$ , nor could any detachment be made out any longer; but there were numerous floating opacities in the vitreous, especially near the seat of the detachment. Dr. Brailey remarked that since, in at least two out of the three cases, the eye had been presumably normal, the detachment would appear to have occurred in association with a healthy vitreous. He found it impossible to understand how either a blow or any violent pressure on the globe could cause a detachment under such circumstances without rupture of the retina, of which he had not been able to find indications in these cases. The rupture would, he thought, be more reasonably attributed to the recoil of the tunics than to the original pressure. The value of the treatment was demonstrated in the third case, where the affection was progressing up to the time of operation. Though valuing puncture, rest, and atropine, he was not convinced as to jaborandi. He thought, in face of these two cases, that a simple puncture, if large enough, was quite as effective as any more complicated process; and, indeed, that it excelled the latter in rendering anæsthesia unnecessary. A bent iridectomy-knife, five millimètres wide, seemed to him to be the most effective instrument.

Mr. Nettleship referred to the case of a man, the subject of myopia, in whom a retinal detachment occurred very rapidly.



In this case he tapped, and made the patient lie on his back. Great improvement followed, and the operation was repeated with further improvement; but two months later he came back as bad as ever, and the other eye had become similarly diseased. He had tapped in many cases, but this was the only one in which any, even temporary, improvement occurred.

*Night Blindness.*—Mr. W. Adams Frost read notes of two cases. A painter, aged 34, had six attacks of night-blindness, each coming on whilst he was painting white houses in the spring, the weather, except on two occasions, being very bright. Each attack lasted about a fortnight, and disappeared under treatment by rest, tonics, and the use of eserine. Vision during the attacks was  $\frac{2}{3} \frac{1}{0}$ , and the visual field was normal. The patient was somewhat anæmic, but there was no history of any illness. He was in receipt of good wages, and had not been underfed. He had never had any symptoms of lead-poisoning, nor had he ever been out of England. A lamplighter, aged 19, was for six weeks engaged in painting the lamp-posts on country roads in excessively bright weather. After three weeks' painting, he suffered severely from pain and lachrymation. Three weeks later he suddenly found that he could not see one evening, and this inability to see in a dull light continued until his visit to the hospital two weeks later. His vision then, in ordinary daylight, was normal ( $\frac{2}{3} \frac{0}{0}$  and 1 J.); the visual field was normal. He presented no signs and had no symptoms of lead-poisoning. He was treated with tonics and instillation of eserine, and recovered in about five weeks. A month later he had a relapse, from which he recovered in about a fortnight. Since the previous attack he had been following his ordinary occupation of lamp-lighting.

Mr. Walter H. Jessop asked Mr. Frost whether he had noticed any patches on the conjunctiva in his cases. Mr. Frost replied in the negative, and Mr. Jessop said that, in three cases coming under his own notice lately, suffering from night-blindness, patches were present in both eyes, looking like small bubbles of air, and easily scraped off. On these dry patches were numerous bacilli of uniform size; these facts had been noted by Snell and others. Two of the cases were under Mr. Nettleship's care at Moorfields, and the third was under Mr. Jessop's care at the Paddington-Green Children's Hospital.

Two were children underfed, one nearly starved, and the third case was an adult man, suffering from albuminuria. Artificial cultivations from two cases showed the same characteristics, especially as to slowness of growth. In the third case, the dry patches disappeared at the same time as the night-blindness.

*Action of Hydrochlorate of Cocaine on the Eye.*—Mr. Arthur Benson had experimented with a 2 per cent. and a 4 per cent. solution of hydrochlorate of cocaine on himself and about twenty-five others. He found that anæsthesia of the cornea and conjunctiva was produced by a drop instilled into the conjunctival sac; that this anæsthesia came on almost immediately after application, and lasted only about five or six minutes, when it gradually but rapidly faded away. So far as his experience went, the drug was of no appreciable assistance in operations, the anæsthesia being too imperfect. In most cases, it produced slight paresis of accommodation, with partial dilatation of the pupil for about half an hour, followed by contraction of the pupil and spasm of accommodation, which again gave way to the normal condition of parts in about one and a half or two hours. He had extracted cataract, done iridectomy and some minor operations with its aid, but found no appreciable benefit except in the most trivial cases. The anæsthesia was very transitory, and it was therefore necessary, in order to obtain the best results, to use the drug very shortly before operating.

Mr. Marcus Gunn had used hydrochlorate of cocaine in three cases, and had come to the same conclusions as Mr. Benson.

Mr. Nettleship had tried it in two cases; it had produced marked anæsthesia without any inconvenience, and he suggested that, if the drops were frequently instilled, so as to maintain the effect, the drug might be practically useful.

The President thought that the dose might be pushed further.

*Living Specimens.*—Dr. W. A. Brailey: 1. Detachment of retina of left eye; decided benefit after scleral puncture. 2. Optic neuritis with increased tension (relieved by eserine), associated with numbness of the face and recent severe pains in the head; some loss of power of the left side, and slight albuminuria. Vision was deteriorating.

*Card Cases.*—Mr. Nettleship : Drawing of new formation of Pigment on the front of the Iris.

Mr. Marcus Gunn : Peculiarly shaped Eyeball. At the yellow spot region the eye was myopic ( $-4$  D), while the inner part of the fundus was hypermetropic ( $+3$  D).

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# ON THE NON-OPERATIVE TREATMENT OF THE SERPIGINOUS HYPOPYON CORNEAL ULCER.

BY GEORGE A. BERRY, M.B.,

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The operation introduced by Saemisch fifteen years ago, and which generally goes by his name, has not only stood the test of time as being a most effectual means of arresting the disease for which it was invented, but has also clearly shown that an energetic interference of some kind has to be resorted to. After six years, experience of the result of his section, Saemisch remarked\* that "From the results obtained by this method we should be quite justified in having recourse to it from the beginning, from the time when the disease assumes its typical form; certainly no harm could be done by so doing." This suggestion appears to have been followed by a number of surgeons, at any rate in this country, so that it is not an uncommon practice to resort to the operation at once or as soon as the serpiginous nature of the corneal suppuration is recognised and pus has shown itself in the anterior chamber.

The very much greater certainty of arresting the spreading of the suppuration by Saemisch's operation than by the older operations of paracentesis at the corneo-scleral margin and iridectomy, and which, by the way, shows that what has to be aimed at is a diminution of the tension in the corneal tissue itself, and not a

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\* Graefe Saemisch, vol. IV., p. 253.

diminution of intraocular tension as is so often stated in our text-books, appears to justify the practice of performing the corneal section early. But as it cannot be denied that in a considerable proportion of cases the operation though arresting the progress of destruction in the cornea is followed by complications in the shape of synechæal iritis, and sometimes in severe cases by still more serious disturbances, one is naturally led to try some means of favourably influencing the course of the inflammation before proceeding to operation. I have had occasion to see put in practice by myself and others almost all the different methods of treatment which have been suggested ; atropine with warm fomentations, eserine, carbolic acid, iodoform, chloride of zinc, nitrite of silver, and the actual cautery. Under all these methods of treatment we may sometimes succeed in avoiding an operation, but it is questionable whether the frequency of such a favourable result is in any case sufficiently great to compensate for the advantage obtained in the way of comparative immunity from any serious complication by performing the section early. For some time, and until within the last six months, I thought not, and was consequently in the habit of practising and advocating early performance of Saemisch's operation. From the following considerations I have lately departed from this line of practice and adopted a treatment which is successful in such a large proportion of cases that I believe the scale is turned the other way.

Recent investigations have shown that the spread of the inflammation is greatly due in most if not all cases to a septic suppuration. From analogy with ulcers elsewhere we should expect then that by destroying the organisms with which the affected tissues are infiltrated by some caustic and then keeping up an efficient antiseptic application, the ulcer would be put under the most favourable conditions for healing. The peculiarity, however, of the form of inflammation with which we have to deal is that the immediately dangerous portion

of the altered cornea the more or less sickle-shaped, yellowish, infiltrated margin by which it extends is really more of the nature of an abscess than of an ulcer, and consequently it is frequently difficult to apply the caustic in such a way as to make sure of its taking effect where it is most required. The first step, therefore, necessary in the majority of cases is to break down the abscess margin into an ulcer. This may be done very easily by means of a grooved spoon or scoop, such as is used for removing foreign bodies from the cornea. I proceed then as follows:—

1st.—Scrape the margin until it is thoroughly broken down, and the whole of the inflamed portion of the cornea presents the appearance of an ulcer, a proceeding which to do thoroughly sometimes takes a little time.

2nd.—Cauterise the whole surface of the ulcer as it then presents itself with a 2°—3° solution of nitrate of silver.

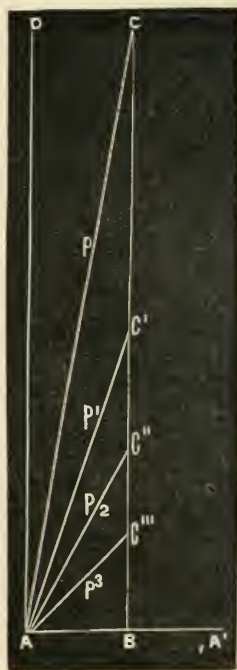
3rd.—Smear into the eye every two hours an ointment composed of one part of finely powdered iodoform to nine parts of vaseline.

This treatment is applicable to and successful in a very large majority of all cases, though there are a few cases, viz., those in which the patient is first seen after a large extent of the cornea has been destroyed and a great amount of pus occupies the anterior chamber, in which I believe it is preferable to perform Saemisch's section immediately, limiting the incision however to a division of the infiltrated margin or margins, a plan which I have found quite as efficient as a complete division of the whole inflamed base, and less liable to be followed by severe complications. A combination of a properly applied cauterisation by means of a thermo-cautery and subsequent antiseptic measures would probably be as efficacious as the method just advocated, but this I have not as yet tried, and indeed the other has the advantage of being easily practised by anyone.

# NOTES ON THE METRE ANGLE. A CORRECTION.

BY ALEX. S. PATTON, A.B., TRIN. COLL. DUB.

Mr. George A. Berry described, in the July number of this Review, a method of estimating the metre angle, but unfortunately he started with an incorrect definition. Nagel, in the Graefe Saemisch Handbuch, X., p. 478 (1880), described the metre angle thus :—



Let A be the centre of rotation of one eye and A' that of the other ; join them, bisect AA' in B and at A and B erect perpendiculars to AA' (AD BC), at A make an angle DAC =  $w$  and from A also let a stream of rays AC', AC'', AC''' . . . . AC<sup>n</sup> pass out cutting BC in

$C' C'' C''' \dots C^n$  and making angles  $CAC', C'AC'', C''AC''', \dots C^{n-1}AC^n$  each equal to  $w$

call  $AC, p$ ;  $AC', p_1$ ;  $AC'', p_2 \dots AC^n \dots p_n$

also call  $AB, m$ ; then

$$\sin w = \frac{m}{p}, \sin 2w = \frac{m}{p_1}, \sin nw = \frac{m}{p_{n-1}}$$

$$\therefore \sin w : \sin 2w : \sin 3w \dots : \sin nw =$$

$$\frac{1}{p} \cdot \frac{1}{p_1} \cdot \frac{1}{p_2} \dots \frac{1}{p_{n-1}}$$

and when  $p = 1$  metre the angle  $w$  is the metre angle and as it is very small it may be taken as being equal to its sign

$$w : 2w : 3w \dots nw = \frac{1}{p} \cdot \frac{1}{p_1} \cdot \frac{1}{p_2} \dots \frac{1}{p_{n-1}}$$

The error which arises from this substitution amounts only to a few minutes for small angles, and for large angles is never more than three degrees (see Nagel's tables).

Mr. Berry measured the metre angle by  $CB, C'B, C''B \dots C^nB$ . The error which arises is manifest thus:—

According to him,

$$CB = 2 C'B = 3 C''B = \dots n C^{n-1}B$$

$$\text{but } CB = \sqrt{p^2 - m^2} \quad C'B = \sqrt{\frac{p^2}{4} - m^2} \dots C^{n-1}B = \sqrt{\frac{p^2}{n^2} - m^2}$$

substituting

$$\sqrt{p^2 - m^2} = 2 \sqrt{\frac{p^2}{4} - m^2} = \dots n \sqrt{\frac{p^2}{n^2} - m^2}$$

squaring out

$$p^2 - m^2 = p^2 - 4m^2 = \dots p^2 - n^2 m^2$$

$$m = 2m = \dots nm$$

which is manifestly absurd.

If, however, in Mr. Berry's propositions you substitute values in terms of  $p, p_n$  and  $m$  for  $S$  and  $D$  where  $p_n$  is the length of the line joining the eye to  $O$  in Mr. Berry's figures,

$$S = \sqrt{p_n^2 - m^2} \quad D = \sqrt{p^2 - m^2} \quad p = 1 \text{ metre} \therefore D = \sqrt{1 - m^2}$$



In figure I.

$$S = \frac{Dm}{m+d} \text{ substituting we have}$$

$$\sqrt{p_n^2 - m^2} = \frac{m \sqrt{1 - m^2}}{m + d} \text{ solving for } p_n$$

$$p_n = \frac{m \sqrt{1 + 2md + d^2}}{m + d}$$

In figure II.

$$S = \frac{Dm}{m-d} \text{ substituting and solving}$$

$$p_n = \frac{m \sqrt{1 - 2md + d^2}}{m - d}$$

In Figure III. Mr. Berry's proposition reads

$$\frac{-S}{m} = \frac{Dm}{m-d} \therefore S = \frac{Dm}{m-d}$$

it should read

$$\frac{-S}{m} = \frac{D}{m-d} \therefore S = \frac{Dm}{d-m}$$

substituting and solving as above

$$p_n = \frac{m \sqrt{1 - 2md + d^2}}{d - m}$$

Thus  $p_n$  is found and the metre angle is equal to  $\frac{1}{p_n}$

As the above formula is very complicated, it seems easier to estimate the angle of squint by means of a perimeter or strabometer, and to reduce by Nagel's tables.

To show the amount of error I quote an example

$$m = .028$$

$$d = .68$$

No. of metre angles as taken above is 20913445 . . . .

As taken by Mr. Berry's method 25285714

By the perimeter the angle was 34°

which reduced by Nagel's method

is equal to 2118748 metre ang.

since 1 metre angle = m (57°2957795 . . .)

when the base line = .056

# A REPLY TO MR. PATTON'S NOTE ON THE METRE ANGLE.

BY GEORGE A. BERRY, M.B.

To my paper (Ophth. Rev., July, 1884, p. 193) suggesting a method of examination which enables one to express the degree of deviation of a squinting eye in a manner which is consistent with the obvious relations existing, more or less closely, between convergence and accommodation, I have given the title "The Determination, &c., in *Mètre Angles*." From my definition, p. 196, as well as from the footnote at pp. 198 and 199, it is made sufficiently clear that the *mètre angle* selected is not exactly the same as Nagel's, which is correctly defined by Mr. Patton,\* inasmuch as from the statements then made it follows that it is an angle the value of which, in circular measurement, changes with its position (though not improbably, always physiologically equivalent, or nearly so), so that a deviation of two *mètre angles*, in the sense adopted, is not equal to twice that of one *mètre angle* or half of four *mètre angles*; nor, indeed, does the expression *n mètres angles* always refer to the same size of angle, whereas the *mètre angle* introduced by Nagel is constant for any particular case. It must be admitted that the choice of the expression *mètre angle* was apt to mislead, and that besides the definition and note given, it might have been better to use some other nomenclature. The consideration which led me to adopt for the angles formed by the vertical mesial plane, and the direction of the visual axis when that line cuts the plane at 1,  $\frac{1}{2}$ ,  $\frac{1}{3}$ , —  $\frac{1}{n}$  *mètre* from the middle point of the line joining the centres of rotation of the eyes, the expression 1, 2, 3—*n mètres angles* respectively, was that having to do with binocular fixation, it is along the mesial line (CB in Mr. Patton's figure) that, as it seems

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\* See my review of the original paper, Edin. Med. Journal, 1880, p. 1137.

to me, the true relationship between convergence and accommodation asserts itself. At all events, for practical estimations of the extent of accommodative and convergent changes, there can be no question that the mesial line forms the proper basis for comparison. I have shown in the note already referred to how it is easy by a simple formula to pass from the mètre angle deviation (in the sense in which it is taken in the paper) to the circular measurement of the deviation, so that should such be preferred for the expression of the angle it can readily be obtained (in the way shown as well as in other ways) without making a peremetric measurement.

It would be easy also to give a formula by which we might express the value of the angle in the true mètre angle notation of Nagel.\* The one given by Mr. Patton is insufficient,† and is only true for a single value of D (or CB in his note); in the case, too, where the divergence is so great as to make  $d \geq m$  it is incorrect. In this case there was a very obvious error in the printing of my formula which Mr. Patton has observed but not properly corrected. Here S is negative, and the proposition which read for my fig. III.

$$- \frac{S}{m} = \frac{Dm}{m-d} \therefore S = \frac{Dm}{m-d}$$

$$* \text{ Deviation} = \frac{m \pm d}{m \sqrt{D^2 + (m \pm d)^2}} - \frac{1}{\sqrt{D^2 + m^2}}$$

When  $d = 0$  the expression for the deviation is also zero, as it should be. In the case of divergence if the object be approached until  $d = m$ , the value of the deviation is evidently expressed by  $\frac{1}{\sqrt{D^2 + m^2}}$ . Finally positive and negative values of  $d$  give different values for the deviation.

† The deviation in this particular case where  $p = 1$  should read

$$\frac{m \pm d}{m \sqrt{1 \pm 2md + d^2}} - 1$$

(See Mr. Patton's calculation in the example given at the end of his paper, which, from disregarding this, comes out too high.)

should obviously read

$$-\frac{S}{m} = \frac{D}{m-d} \therefore -S = \frac{Dm}{m-d}$$

It is somewhat extraordinary to find that Mr. Patton should have inferred that because according to my definition

$$CB = {}_2C'B = {}_3C''B = \dots \dots nC^{n-1}B \quad (\alpha)$$

I should also be willing to admit that

$$p = {}_2p' = {}_3p'' = \dots \dots (n+1)p^n \quad (\beta)$$

and that he should make such an inference the basis of an unnecessarily long *reductio ad absurdum* demonstration to show the error which must arise from assuming that the ratios between the hypotenuses of a number of right-angled triangles on the same base are the same as those between the remaining sides. It is clear that we must select either ( $\alpha$ ) or ( $\beta$ ) alone and stick to it; the only question is which is most consistent with a practical and scientific basis for measurement.

The conclusion at which Mr. Patton arrives is, that owing to the rather formidable calculation which has otherwise to be made, it is easier to determine the angle of deviation with the perimeter, and reduce to mètre angles by Nagel's table. To this I would make three objections, which I shall give in the order of their importance. (1.) The main practical advantage in the method of examination I have proposed is that without any apparatus the extent of muscular deviations can be determined *for all distances of fixation*, and referred at the same time to a scale which brings out any existing relation between the deviation and the state of accommodation for these different distances. (2.) The *best* (assumed) basis for making these measurements and comparisons leads to a formula so *simple* that there is no necessity for any table giving its value under different circumstances. (3.) It is in any case not always possible to make the examination with a perimeter.

MDLLE. ELLABY (Paris). *Amplitude of Convergence.*  
*Thèse pour le Doctorat en Médecine, Paris, 1884.*

The object of Mdlle. Ellaby's thesis is to ascertain what amplitude of convergence may be regarded as normal, and her investigations were made upon 172 individuals. The unit of measurement made use of is Nagel's metre angle, which may now be regarded as the accepted standard of notation in this branch of ophthalmology.

A metre angle is the angle formed by the visual axis of each eye with the median line when the eyes are fixed upon an object lying on this line at one metre's distance from each eye. This angle, of course, is equal to that through which the eyeball is rotated from the position it occupies with parallel visual axes to that it assumes in fixing an object at 1 m. distance. If, then, the object is situated at half this distance the convergence would be 2 metre angles, if at one-fourth the distance 4 metre angles, if at one-tenth the distance 10 metre angles, and so on. The size of the metre angle varies with the length of the base line joining the centres of rotation of the two eyes, and also with the amount of convergence, but the variations in the first case are so slight that they in no wise lessen its value as a practical unit of measurement, and those in the second case only become important in such very high degrees of convergence (at distances of less than 6 cm. from the eyes) that they may be neglected.

The amplitude of convergence is ascertained by finding the nearest point of binocular fixation, punctum proximum,  $P^e$ , the corresponding metric angle being expressed by  $p^e$ . The furthest point of binocular fixation, punctum remotum,  $R^e$  is then measured, and the corresponding metric angle denoted by  $r^e$ . The simple formula of  $a^e = p^e - r^e$  ( $a$  = amplitude of convergence) gives the required result. The nearest point of binocular fixation is where crossed diplopia begins to manifest itself, and the furthest point where homonymous diplopia appears. When the minimum of convergence occurs with parallel visual axes  $R^e$  is situated at infinity, and the corresponding angle of convergence  $r^e = 0$ ; but in most cases the eyes can diverge beyond this position of parallel visual axes, and the convergence in these cases becomes negative;  $r^e$  then becomes negative ( $-r^e$ ). And the formula is  $a^e = p^e - (-r^e)$  or  $a^e = p^e + r^e$ .

This punctum remotum is determined generally by the aid of prisms, and the value of the angle of divergence is expressed in metre angles by dividing the number of degrees that the eye diverges by  $1^{\circ}50'$  which is the value of a metre angle when the distance between the centres of rotation of the eyes = 64 mm., the normal mean.

The formulas for the amplitude of convergence are then identical with those for the amplitude of accommodation, and Mdllé. Ellaby follows Landolt in distinguishing them by a small "a" for accommodation, and a small "c" for convergence.

Thus accommodation

$$\frac{1}{A^a} = \frac{1}{P^a} - \frac{1}{R^a}, \text{ and } a^a = p^a - r^a;$$

and convergence

$$\frac{1}{A^c} = \frac{1}{P^c} - \frac{1}{R^c}, \text{ and } a^c = p^c - r^c.$$

A simple little instrument, termed by Landolt the ophthalmodynamometer, served to measure the amplitude of convergence. It consists of a small opaque cylinder surrounding a lighted candle. This cylinder is furnished with a vertical slit, which is covered by a piece of muffled glass. A tape attached to the cylinder measures the distance from the eyes at which crossed diplopia manifests itself when the cylinder is approached to the eyes, and this point gives the maximum power of convergence. One side of the tape is marked in centimetres, and the other with the corresponding number of metre angles. The minimum of convergence is measured by placing a candle at six metres distance, and ascertaining the strongest prism (base towards nose) which can be applied without producing homonymous diplopia.

The deviation produced by a prism being approximately equal to half the angle of the prism, and the effect of a prism before one eye only being equally divided between the two eyes, the deviation of each eye is only equal to a quarter of the angle of the prism. This quantity divided by  $1^{\circ}50'$  gives the amount of the deviation in metre angles for an eye when the base line (joining the centres of the globes) equals 64 mm.

If the eyes cannot overcome any adduction prism, but possess binocular fixation at 6 m.  $r^c=0$ .



If further divergence is possible,  $r^c$  becomes a minus quantity. If homonymous diplopia exists at 6 m. distance, the weakest adduction prism which unites the double images is the measure of the minimum of convergence, and in this case  $r^c$  is positive.

The observations were made upon 172 individuals of various ages, and with different degrees of ametropia, some being emmetropic. Great variations were found in the amplitude of convergence.  $A^c$  varied between  $1.25^{am.}$  and  $22^{am.}$ . The maximum of convergence ( $p^c$ ) varied between 0 and  $21^{am.}$ ; the minimum ( $r^c$ ) between  $-2.71$  and  $+8^{am.}$ .

The refraction of the eyes seemed to have little or no influence upon the mean amplitude of convergence.

	$p^c - r^c = a^c$
For 16 Emmetropes	$9.10 - (-0.80) = 9.90^{am.}$
„ 79 Hypermetropes	$9.47 - (-0.81) = 10.28^{am.}$
„ 66 Myopes	$9.30 - (-0.99) = 10.29^{am.}$

It is seen by the above that the amplitude of convergence is much the same in hypermetropia and myopia, in both being a little superior to what it is in emmetropia.

Within what limits can the amplitude of convergence vary without becoming abnormal? To ascertain this point all the cases were grouped in which no asthenopia attributable to defective convergence could be detected. The cases were 65, of whom 9 were emmetropes, 14 hypermetropes, 23 hypermetropic anisometropes, 5 myopes, and 14 anisometropic myopes. The results were—

In E.— $a^c$  varied between  $16.5^{am.}$  and  $10.75^{am.}$ , the mean being  $13.03^{am.}$

$p^c$  varied between  $10^{am.}$  and  $16^{am.}$ , the mean being  $12^{am.}$

$r^c$  varied between  $-0.5^{am.}$  and  $-2^{am.}$ , the mean being  $-1.03^{am.}$

In H.— $a^c$  varied between  $22^{am.}$  and  $10.5^{am.}$ , the mean being  $14^{am.}$

$p^c$  varied between  $10^{am.}$  and  $21^{am.}$ , the mean being  $13.2^{am.}$

$r^c$  the mean =  $0.78^{am.}$

In H with anisometropia  $a^c$  varied between  $11^{am.}$  and  $20^{am.}$ ,  
the mean being  $13.46^{am.}$

$p^c$  varied between  $10^{am.}$  and  $20^{am.}$

$r^c$  varied between  $0^c$  and  $-1.5^{am.}$

The mean of  $a^c$  for all hypermetropics (with and without anisometropia) was  $13.72^{am.}$

In M the mean of  $a^c = 12.5^{am.}$

the mean of  $p^c = 11.3^{am.}$

the mean of  $r^c = -1.2^{am.}$

In M with anisometropia  $a^c$  varied between  $10.5^{am.}$  and  $20.75^{am.}$ , the mean being  $14.05^{am.}$

$p^c$  varied between  $9^{am.}$  and  $20^{am.}$

$r^c$  varied between  $0^c$  and  $-0.5^{am.}$

The mean of  $a^c$  for all myopes (with and without anisometropia) =  $13.27^{am.}$

In myopia then  $P^c$  is further removed from the eyes, and the positive power of convergence is relatively feeble compared with the negative. These myopes, however, possessed M not greater than 7 D.

Four patients who suffered from muscular asthenopia, and whose trouble was removed by appropriate prisms, afforded data from which to calculate the proportion between the convergence in use and that in reserve, which is necessary for continued binocular fixation during work. It was found in these cases that at least  $\frac{2}{3}$  of the amplitude of convergence should be in reserve for continued work to be carried on without asthenopic trouble.

A series of eighty-one cases is appended in illustration and support of this view.

This extremely interesting thesis concludes with an examination into the amplitude of convergence in cases of strabismus, and the effects produced upon it by tenotomy.

In three cases of strabismus convergence the value of  $a^c$  after tenotomy became  $5^{am.}$ ,  $8^{am.}$ , and  $10.5^{am.}$  respectively, and in another case in which the external rectus was advanced in addition to the tenotomy of the internus  $a^c$  became  $17^{am.}$

In five cases, too, of slight divergent strabismus operated on either by tenotomy or advancement, the value of  $a^c$  was much increased by the operation. After the operations, the amount of  $a^c$  varied between  $8^{am.}$  and  $14.5^{am.}$

M. W. v. SCHULTEN (Helsingfors). *Von Graefe's Archiv.*, XXX., 3, p. 1, 1884. Experimental Investigations upon the Intraocular Circulation and its connection with the Intracranial Circulation.

Schultén's experiments were made, for the most part, upon rabbits, whose eyes he considers admirably suited for the purpose, as their vascular arrangements do not differ essentially from those of the human eye.

The elasticity of the sclerotic coat, upon which different opinions have been held by various well-known authorities, was the first point investigated. Schultén measured the increase of volume produced by sudden injections of a salt solution into the enucleated eyeball at a pressure of 5 mm. Hg. The mercury standing at a given height, the pressure was suddenly raised 5 mm., and the amount of salt solution that entered the globe was noted. The pressure was then lowered again by 5 mm. and the amount of the solution that returned noted, this being less than the former in consequence of the escape of some of the fluid from the globe by the ordinary channels of filtration. The mean between the two quantities corresponded to the increase of the intraocular volume, and this increase is expressed in ten thousandths of the volume, at a pressure of 10 mm. Hg., in the following table :—

Increase of pressure in mm.		Increase of volume in ten thousandths of the volume at 10 mm. Hg.		Mean increase of volume per mm.
1 — 5	}	174	....	19·3
5 — 10				
10 — 15	....	49	....	9·8
15 — 20	....	29	....	5·8
20 — 25	....	21	....	5·2
25 — 30	....	14	....	2·8
30 — 35	}	18	....	1·8
35 — 40				
40 — 50	}	25	....	1·2
50 — 60				
60 — 70	}	18	....	0·9
70 — 80				
80 — 90	}	16	....	0·8
90 — 100				

From these figures it is manifest that the elasticity of the sclerotic coat at low pressures is relatively high, and that it rapidly diminishes, so that at 30—40 mm. Hg. it has already become inconsiderable.

The intraocular circulation was studied in the retinal vessels by means of a magnified inverted image of the fundus obtained in the following way. The light from a lamp was thrown by means of a concave ophthalmoscope mirror of 20 cm. focus and 10 cm. diameter upon a second large concave mirror, from which it was reflected into the eye under observation. The inverted image of the fundus formed by this second mirror formed the object for the eye of the observer. By this means Schultén obtained an enlargement of from 30 to 60 diameters, and was able to observe the finest twigs of the central artery, and even the capillary network in the papilla. He observed the movement of the blood in the veins and even in the arteries when its rate was slow.

In the earlier experiments Leber's manometer was made use of, but in the later ones Schultén substituted for it one of his own invention, the canula of which was inserted into the vitreous humour, and not as has usually been done into the anterior chamber. At the lower end of a U-shaped tube, which formed the manometer, he fixed a caoutchouc bag into which a portion of the mercury descended. This bag could be compressed by means of a screw, so that the mercury in the U-shaped tube could be raised to any required height. One end of this U-shaped tube was joined to the canula inserted into the vitreous by means of india-rubber tubes, between which was inserted a capillary glass tube of 8 to 9 cm. length. The other end could be closed by means of a clamp upon another piece of india-rubber tubing. All the tubes between the manometer and the eyeball were filled with a  $\frac{1}{2}$  % solution of chloride of sodium, except that one bubble of air was allowed to lie in the centre of the capillary tube. The position of the bubble was noted before opening the communication between the manometer and the eyeball, and the pressure necessary to restore this bubble to its original position (obtained by raising the column of mercury by means of the screw on the bag fixed at the bottom of the manometer) read off on the manometer.

The effects of a gradual increase of pressure upon the retinal circulation consisted in a gradual diminution in the size of the veins, disappearance of the red hue of the disc (due to its capillary network), and at higher pressures an intermittent bloodstream in the arteries of the choroidea as well as in those

of the retina, the veins not exhibiting this phenomenon, but merely becoming thinner. This pulsation varied with respiration, the maximum coinciding with inspiration and the minimum with expiration when artificial respiration was used, the opposite being the case with natural respiration. When no more blood can enter the globe, owing to the high pressure, the vessels are not left empty, but the blood discs collect into masses and the vessels have then a granular appearance which does not alter though the pressure be raised up to more than 200 mm. Hg. Where the pressure is then lessened pulsation reappears, and the vessels become larger and fuller than before the pressure was raised. It has been known for long that the pressure at which the stream of blood ceases to move in the retinal and choroidal vessels is equal to the maximum pressure of the blood in the ophthalmic artery (v. Kries).

The normal tension in rabbits' eyes varies between 15 and 30 mm. Hg., and in a dog amounted to 24 mm. Hg. Only very slight variations were found between the pressure in the vitreous and that in the anterior chamber measured simultaneously. A marked and constant alteration accompanied the heart beats, increased in amount at higher pressures. No alteration in the calibre of the vessels could be observed during this intraocular pulsation, and no venous pulse was ever observed in the eyes of the rabbits examined.

The blood pressure in the ophthalmic arteries was almost exactly equal to that in the large arteries of the body—femorals and carotids. It has been shown long ago by Donders that the intraocular pressure stands in direct relation to that in the arteries, and must naturally be equal to the latter when we subtract from the arterial pressure that part of the latter which is accounted for by the elasticity and tonus of the vascular walls.

An intraocular pressure of from 8 to 12 mm. Hg. was found constantly after death, no matter what the cause of the death might be, and this was unaltered by subsequent enucleation. From this it is concluded that the intraocular fluids are submitted to a pressure of 10 mm. Hg. quite exclusive of any pressure transmitted from the blood vessels. The factors then which determine the vascularity of the globe and its tension are the lateral pressure in the blood vessels, their elasticity and

tonus, the quantity of the intraocular fluids, and the extra-ocular pressure principally due to the contraction of the orbital muscles.

Compression of the descending aorta and consequent increase of blood-flow to the head and neck produced a constant rise of arterial pressure of from 20 to 30 mm., and a parallel increase of intraocular pressure, but not to the same extent. The intraocular vessels seemed fuller, but no marked alteration took place in their calibre. When the compress was removed the blood pressure returned to its original height, as also the intraocular pressure. Compression of both external jugular veins produced an increase of intraocular pressure varying from 5 to 13 mm. Hg., and ligatures of the *venæ vorticosæ* an increase which amounted to 39 mm. Hg. in one case, and to 20 in another. The effect of ligature of the carotid upon the intraocular pressure is shown in the following table :—

Original pressure.		Ligature of the carotid of the same side.		Ligature of both carotids.
20 mm.	....	12 mm.	....	11 mm.
22 „	....	12 „	....	10 „
22 „	....	12 „	....	11 „
24 „	....	15 „	....	11 „
26 „	....	14 „	....	10 „
28 „	....	13 „	....	—
30 „	....	12 „	....	11 „
38 „	....	18 „	....	—
45 „	....	36 „	....	—

After the compression had ceased an increase of intraocular pressure above the original pressure was often observed.

Little or no effect was produced upon the blood pressure in the ophthalmic arteries by ligature of the carotid on the opposite side, but ligature of the carotid upon the same side produced an important lowering. The blood supply to the two sides of the cerebrum is therefore to a large extent independent, and also that to the two eyes.

Loss of blood to the extent of from 1 to 2 % of the weight of the rabbit lessened the blood pressure by one-third or even one-half, and reduced the intraocular pressure.

Electrical stimulation of the peripheral end of the divided vagus reduced the intraocular pressure by 10 to 12 mm. Hg.

After death, blood was always found in the intraocular vessels, even when the intraocular pressure had been previously



artificially raised. This Schultén accounts for by the difficulties put in the way of the exit of the blood in its passage through the sclerotic tissue and optic nerve.

In rabbits it was found that electrical stimulation of the cervical sympathetic produced a regular contraction of the retinal and choroidal arteries, and an equally regular fall in the intraocular pressure, which was more marked the greater the contraction of the vessels.

Stimulation of the peripheral end of the divided cervical spinal cord produced a primary increase in the intraocular pressure, which was followed by a decrease due to the contraction of the ocular vessels, but this decrease was not equal to the primary increase. It was also found that contraction of the ocular vessels followed upon stimulation of the cord after division of the cervical sympathetic, provided the cord was divided above the level of the 3rd or 4th cervical vertebra, proving that vasomotor filaments proceed from the upper portion of the cervical cord to the superior cervical ganglion. Stimulation of the sciatic nerve produced similar effects, increased blood pressure, and increased eyeball tension, as also did irritation of the cornea by creosote, ammonia, and nicotin.

Continued high tension in the eyeball suddenly removed was followed by a rapid rise of tension, due to the paralysis of the walls of the blood vessels. In this connection Schultén calls attention to the dangers of the pressure bandage so much used in ophthalmic practice.

Division of the cervical sympathetic and extirpation of the superior cervical ganglion produced no effect whatsoever on the blood vessels of the eyeball or its tension.

Division of the trigeminus produced no certain effect upon the intraocular vessels or upon the intraocular pressure, but stimulation of the trunk of the nerve produced effects which lead Schultén to conclude that it contains nervous filaments, whose irritation causes dilatation of the intraocular vessels. His experiments are, however, yet too few to admit of very certain conclusions upon this important point.

Further experiments upon many of the points touched upon are being undertaken.

# REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SOCIETY.

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HELD AT HEIDELBERG,

ON THE 15TH AND 16TH SEPTEMBER, 1884.

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BY H. R. SWANZY, F.R.C.S.I., AND J. B. STORY, F.R.C.S.I.

(Concluded from page 322.)

Dr. Horstmann (Berlin). *The Condition of the Refraction in the Human Eye during the first Five Years of Life.*—In order to determine this point the author had examined the eyes of 150 children, divided into three groups of 50 each. The children belonged chiefly to the upper and middle ranks of life, as the occurrence of myopia is more frequently observed in them than in the lower classes of the population.

The first group included 100 eyes of 50 new-born children, *i.e.*, from the eighth to the thirtieth day of life.

Ed. von Jaeger in the year 1861 examined 100 eyes of children between the ninth and sixteenth day of life, and found amongst them 17 hypermetropic, 5 emmetropic, and 78 myopic eyes. The large number of myopic eyes here is remarkable, and the explanation for it lies in the excessive convexity of the lens, as Jaeger did not employ atropine. The results obtained by Ely, who in 1879 examined 154 atropinised eyes, differ considerably from those just mentioned, as he found myopia 27 times, emmetropia 21 times, and hypermetropia 108 times. Soon afterwards the author examined 40 atropinised eyes of children from eight to twenty days old, and found amongst them 28 hypermetropic, 8 emmetropic, and 4 myopic eyes. He observed, moreover, that mydriasis ad maximum very often cannot be produced in the new-born, and concluded from this that atropine also does not completely relax the accommodation at that age, and that the usual condition of refraction then is hypermetropia. Königstein's investigations confirmed this view. He found in 300 new-born children not a single myopic eye, and very few emmetropic eyes, nearly all being hypermetropic. According to Schleich, who examined 150 children in the first eight days of life, the constant condition is hypermetropia, averaging 4.4D. Ulrich found the same. Jannick

Bjerrum observed, in 87 children of ages ranging from seven hours to fourteen days, 44 times H4.0, 17 times H2.0, 23 times E, and 3 times M.

The want of agreement in these results in some respects induced the author to undertake the ophthalmoscopic determination of the refraction in the 50 new-born children already referred to, the eyes having been first brought under the influence of atropine. In 16 eyes there was H1.0, in 16 H2.0, in 36 H3.0, in 14 H4.0, in 4 H5.0, in 2 H6.0, in 10 E, and in 2 M. The average refraction amounted thus to 2.4D. An incomplete mydriasis was noticed in 10 eyes, 6 of them being hypermetropic 1D, and 4 emmetropic, while with a corneal diameter of 8.5 to 9.5 mm. the diameter of the pupil with complete mydriasis was 5 to 6 mm., in the eyes with incomplete mydriasis it was only 3 to 4 mm. In the child with myopia (2D) in each eye complete mydriasis was effected, and the fundus oculi was perfectly normal. In 42 cases the condition of refraction of the parents could be ascertained, but it was not possible to prove any hereditary influence on the refraction at this time of life. The father only of the myopic child had compound myopic astigmatism, while the mother was hypermetropia. As regards other matters noted in the eyes of these new-born children, remains of the pupillary membrane were seen three times, and retinal hæmorrhages twice. The latter were found in one eye of an eight-day old child, and in one eye of a ten-day old child, and, in each case, the delivery had been very protracted.

The second group contained 50 children from one to two years of age. Here the effect of atropine was always satisfactory. Of these 100 eyes 2 had M4.0, 4 My2.0, 10 E, 24 H1.0, 32 H2.0, 18 H3.0, 6 H4.0, and 5 H5.0 and higher. In those of the myopic eyes there were signs of a commencing crescent. The refraction of the parents of 39 children was ascertained. The mothers of two of the myopes were highly myopic, while the fathers were emmetropic. The parents of a third myope were both emmetropic or slightly hypermetropic. Of five emmetropic children one mother and two fathers were myopic, the four other mothers and three fathers being emmetropic or slightly hypermetropic. In no instance were both parents myopic. Of the parents of 31 hypermetropic children

both father and mother in four instances had slight or medium myopia; six times the mother alone was myopic, and seven times the father alone, the eyes of all the other parents being emmetropic. In this group the first traces of developing myopia show themselves. The tendency to it would seem to be congenital, for in the cases of two myopic children one of the parents was highly myopic.

The last group contained 100 eyes of 50 children of four to five years of age, on which consequently school life had not yet had any influence. The effect of atropine in each case was complete. In two eyes there was  $M_3^0$ , in 5  $M_2^0$ , in 26  $H_2^0$ , in 16  $H_3^0$ , in 8  $H_4^0$ , in 6  $H_5^0$  and higher. In the child with  $M_3^0$  there was an atrophy of the choroid at the temporal margin of the optic papilla, and in five other myopic eyes the first signs of a crescent were observed. The condition of refraction of the parents of five myopic children was known; the father being highly myopic twice, the mother myopic once, both parents myopic once, and in the fifth case both parents were emmetropic. Of four emmetropic children the mothers were twice myopic, and the fathers once; and in 31 hypermetropic children, the mothers five times, the fathers three times, and once both parents. The fact that Ed. von Jaeger found in 100 eyes of children from two to six years of age, 62 myopic, 30 emmetropic, and 8 hypermetropic eyes can be explained only by the circumstance that here also he examined without the aid of atropine.

The conclusions of the author are as follows:—The condition of the refraction of the eye of the new-born child is for the most part hypermetropic, sometimes it is emmetropic, and in rare cases myopic. It is probable that in the latter it is a lental myopia. As life advances the refraction steadily increases, hypermetropia becomes less frequent, while emmetropia and myopia are more common. The tendency to the latter is very often congenital, and it shows itself even sometimes soon after the first year of life, and it may with little doubt be assumed that these are the cases in which the highest degrees of myopia become developed. They are, as Tscherning has pointed out, not a consequence of school life, but show themselves previously, and are only increased by the school. The medium and lower degrees of myopia, however, can be caused by school studies.

## OPHTHALMOLOGICAL SOCIETY.

NOVEMBER 13th, 1884.

THE BOWMAN LECTURE ON THE RELATION OF CERTAIN  
DISEASES OF THE EYE TO GOUT.

BY JONATHAN HUTCHINSON, F.R.S.

The following abstract will convey an idea of the scope and great value of Mr. Hutchinson's lecture. For a full report the reader is referred to the weekly journals :—

An enquiry as to the relations between certain diseases of the eye and gout is an important one, for a gouty taint is an extremely common occurrence among a large proportion of the British population. It is also one of intricacy and difficulty. The arguments and assertions contained in the lecture have been based on the careful examination of a long series of cases, some of which are already recorded in the R. L. O. H. Reports, while others are not yet published.

A distinction between gout and rheumatism is often difficult to make, but for purposes of accurate clinical pathology must be insisted on. By gout is meant all states of health which are connected directly or remotely with the accumulation of lithate of soda in the blood, as the result of over-feeding or defective assimilation. Two conceptions, distinct but not antagonistic, of what gout is may be laid down. First there is dietetic or humoral gout : a blood condition induced in part by errors in feeding, and in part by defects in assimilation and depuration ; it concerns food, digestive power, exercise, and integrity of the kidneys ; in it lithæmia is essential, and the deposit of urates in the tissues almost equally so. Secondly, there is the modification of tissue in the individual, and in his descendants, which humoral gout may leave behind it. A man in whom the causes of humoral gout have been for a long time active may later, by care, keep his blood free from urates, yet his tissues will have become modified in such a way that they will remain prone to suffer in a peculiar manner when exposed to ordinary causes of disease ; the nervous and vascular systems in particular are liable to suffer in this way. If such a man

sprain a joint it will not recover as though he had never had gout, yet the inflammation will not be that which is typical of the gouty state. Moreover, he will transmit to his descendants not only a special liability to acquire humoral gout under ordinary exciting causes, but a tendency to forms of inflammation or of degraded nutrition which, though not unequivocally gouty and not obviously dependent on the ordinary causes of gout, are yet the direct consequences of it in the parent. Many forms of rheumatic gout probably hold such a relation to true gout, and the list would include lumbago, sciatica, neuralgia, crippling rheumatism, arthritis deformans, osteoarthritis, many forms of iritis, and many cases of glaucoma. Rheumatism must, as far as possible, be distinguished from gout. From the idea of rheumatism it is well to exclude all causes connected with food and assimilation, and to count only those which refer to climate and weather, especially exposure to damp and cold. The rheumatic diathesis, like the gouty, may become ingrained and modified by hereditary transmission. The hereditary diathesis of rheumatism (arthritic susceptibility to weather) may easily co-exist with that of gout (arthritic susceptibility to diet); and each of them, or both together, may combine in endless variety with other forms of morbid tendency.

*"Hot Eye," Irritable Eyes, Quiet Gout, &c.*—In families liable to gout, for one person who suffers acute attacks of podagra, there are often half-a-dozen who are the subjects of minor symptoms. After taking beer or wine injudiciously, as to quantity or quality, they experience slight pricking pains in joints, attended by lithic acid in the urine, and other unmistakable signs of the diathesis. The liability varies with the weather and time of year, and it often ends, unless precautions be taken, in a sharp attack in the great toe. Amongst the signs of this quiet gout are repeated short attacks of congestion of the eye. Usually, one only is affected, but sometimes both. The conjunctiva becomes red, and the eyeball feels hot, and pricks, as if sand were in it. The attack may come on within half-an-hour of the meal which has disagreed, and it may last a few hours, or a day or two. Sometimes, owing to interference with the ciliary muscle, vision is slightly dim, and all attempts at accommodation are usually painful. Those who are liable



to hot eye, not unfrequently in the end suffer from iritis. On the other hand, many are liable for years to very frequent attacks of it, without apparently any risk of its assuming more serious proportions. In the intervals of the attacks, the eye is usually quite well; the definitely paroxysmal character, the sudden development, and the very complete and rapid disappearance mark the arthritic relationship. Those who suffer from unequivocal gout often experience shoots of sharp pain in the eyeballs. Many cases of irritable hyperæsthetic and easily tired eyes in young persons are in association with inherited gout, and there is in the present day a tendency in such cases to push the recommendation of spectacles to an excess. Some slight degree of hypermetropia is detected, and it is assumed to explain the irritability of the eye. Yet glasses do no good, and, in fact, only increase the irritation. In such cases, very often, the real malady is inherited gout.

*Transverse Calcareous Bands of the Cornea.*—The deposit in this disease is usually calcareous. The disease occurs in persons very likely to suffer from gout, and sometimes with a gouty history; but we are not as yet justified in holding that the deposit is in direct connection with that diathesis.

*Arthritic Iritis.*—Several forms of iritis are arthritic in origin; they occur to those who are liable to attacks of inflammation of joints, and under conditions similar to those which excite the inflammations of the joint. Both the eye and the joint affection are in some cases prone to occur in an acute but transitory attack. Both are apt to recur after periods of complete immunity, whilst both may assume a chronic, persisting, and destructive form.

First there is a common form in which the iritis occurs in acute transitory paroxysms. Its subjects are usually men, and often of vigorous health, and past middle life. The iritis scarcely ever affects both eyes at the same time, but occurs first to one and then to the other, sometimes keeping to the same eye during several successive attacks, and then leaving it to assail its fellow. The attacks are often acute, beginning very suddenly, and attended with great pain. When they subside, they subside completely, and leave the eye without the slightest degree of irritability. The duration of the severity of an attack

may vary greatly at different times in the same patient. The tendency to form adhesions is extremely great. In most cases of this class, the disease restricts itself to the iris, and shows no tendency to disorganise the globe. Thus, in time, the pupils may be almost occluded, and yet very fair sight may be retained. This recurrent form of iritis often occurs in those who are the subjects of unequivocal gout, but in a far larger number the concomitant symptoms are those of rheumatic arthritis, and not of true gout. The question remains whether this form of rheumatic gout, although unattended by lithate of soda deposit, be not, in reality, a hybrid disease possessing, in addition to an unquestionable share of rheumatism, an admixture also of gout-tendency. The infrequency of the disease in women, the age, the habit of body, and the mode of life of its subjects, seem to support this view; so does the severity of the attacks, and their rapid and complete subsidence when once the point is turned. When this form of iritis does occur to women, it is probably never so acute or so paroxysmal as in men; and it almost always happens to those whose relatives have suffered from gout.

Secondly there is the iritis which occurs in connection with gonorrhœal rheumatism. Iritis associated with ordinary rheumatic fever or with that type of arthritis to which the name of crippling rheumatism may be given, in other words, iritis in association with either acute or chronic rheumatism, is extremely rare. In men, however, rheumatic affections, acute or chronic, induced by gonorrhœa, are not unfrequently accompanied by iritis. This iritis is less distinctly paroxysmal, and much more liable to persist and be destructive, than in the form just described. The reason why gonorrhœal rheumatism so often causes iritis is that it occurs usually to the subjects of inherited gout.

A third form of arthritic iritis is one which affects women more frequently than men, which not unfrequently attacks both eyes at once, and which is apt to spread to the ciliary region and choroid, to persist, and to prove destructive. In a very considerable proportion of the women who suffer from this form, there is a history of gout in former generations.

Another group of arthritic iritis might be constituted of cases in which the malady happens to young patients, and proves but slightly, if at all, liable to recur. These single

attacks of iritis, without history of gonorrhœa or syphilis, and occurring in young persons, usually affect the male sex, and almost always there is the history of gout in relatives.

Finally there is a group of cases, though one of little clinical importance, in which iritis occurs in association with glycosuria. In these the patient is almost always the subject of gout also.

In certain cases of arthritic iritis the anterior chamber fills with a soft gelatinous jelly-like mass, which produces an appearance alarming to the uninitiated, concealing the pupil, and suggesting entire destruction of the cornea; it is, however, susceptible of very rapid absorption, and may, in the course of a few hours, clear right away. This peculiar appearance is probably a strong indication of gout. The same remark, though with less certainty, applies to the rare cases of iritis complicated with hæmorrhage.

*Insidious and Destructive Iritis from Inherited Gout.*—There is a very peculiar form of destructive iritis, occurring for the most part in young persons, which stands in all cases in direct relation with the inheritance of a gouty constitution. It does not occur to those who themselves suffer from attacks of gout, but to their descendants. Among eleven patients clearly illustrating this connection, four were females and seven males, but the most typical and severe forms of disease occurred in the females. In all cases, both eyes ultimately suffered, but only in one were both affected simultaneously. In three instances last-joint arthritis, that is to say destructive inflammation of the last joints of the digits, occurred. In all the cases, vitreous opacities, as well as iritic adhesions, were developed. In most of the cases, the eye which was last attacked suffered most, and a decided tendency was shown for the disease to come to an end as the patient advanced in life. In several cases, the eye was saved by repeated iridectomies; and in one or two, change of climate seemed to be very beneficial. In several of the cases, the patient had been reduced almost to blindness. In three, one eye had been excised, and in one, both were quite lost. In all excepting two, the disease had begun between puberty and the age of 25; and it would appear to be the fact that, the earlier it begins, the more severe it is. To these eleven cases, details of which have been already published, three very striking ones, all

in females, are now added; two of them illustrate a fact previously once or twice noticed, namely, that there is sometimes a tendency to the formation of cataract.

*Relapsing Cyclitis.*—This name is used to designate a peculiar cyclo-kerato-iritis involving the ciliary region of the sclerotic, the adjacent part of the cornea and the iris. Sometimes one of these structures suffers more than the others, but usually all are involved. It seldom damages the pupil itself, and seldom invades the centre of the cornea, or only very late in the disease, and it does not show much tendency to involve the choroid or vitreous. It usually begins in one eye, and only affects the other after a long interval, and the last one usually suffers more severely than the other. It may begin in early life, but often does not do so till middle periods. When once it has begun it never wholly leaves its victim, but continues either to persist with slow chronicity, or recurs over and over again, after intervals of health. It causes scars in the ciliary part of the cornea, thinning and discoloration of the ciliary region of the sclerotic, and ends either by inducing staphyloma or by making the whole cornea dull. It may occasionally become needful to excise the eyeball, on account of the persisting irritability, combined with great impairment. It affects, apparently, women more frequently than men. It is a peculiar type of disease, and it would not be difficult to place side by side a group of examples of it all exactly alike. No treatment short of a complete change of climate does much to benefit it. In this respect it is much like the form of iritis which is a direct result of inherited gout. It is very probable that, in some cases, the constitutional cause of this destructive and persisting disease is gout.

*Can Gout cause Neuritis.*—Gout can cause the tissues of a joint to inflame, and œdematous effusion, with cell-proliferation, in fact, the ordinary phenomena of inflammation, are the results. It can cause the tissue of the iris to inflame in a precisely similar manner, and with like results. Can it attack any of the structures of which the nervous system is composed? Can it cause inflammation of ganglia, of nerve-trunks, or of their investments, or may it indeed attack the central organs? If we admit that, in the gouty condition, inflammations may

attack the cellular tissue in any part of the body, it is difficult to suppose that the cell-elements which enter into the formation of nerve-trunks, for instance, will always escape. It is likely that many nervous affections may be due, not to central disease, but to primary inflammation of the connecting trunks or of the peripheral organs. Chronic neuritis, probably beginning peripherally, is a part of leprosy. Probably it is often a part of syphilis, and possibly it occurs also in locomotor ataxy. How else explain many of the transitory forms of ptosis, &c., which occur in the two latter diseases? There are cases (several were given in detail by the lecturer) in which paralysis of the third nerve and inflammation of the optic nerve appear to depend upon gout. In the case of a young lady, aged 16, who presented optic neuritis in one eye only, the diagnosis of the gouty causation depended upon the entire absence of the more ordinary causes and concomitants of optic neuritis, the recurrent nature of the affection, its want of symmetry, and the exceptionally strong family-history, both parents and many other near relatives having suffered.

*Glaucoma.*—It is suggested that, in the production of this disease, a gouty tendency often takes a large share, particularly in the exceptional cases in which glaucoma shows itself in early life.

*Retinitis Hæmorrhagica* is rarely seen, except in those who are themselves gouty. It is never seen in association with inheritance merely of a gouty constitution, but is found with lithæmia in free livers, who have usually experienced unequivocal attacks. It is a disease of middle life, or of advancing years, and in its more typical forms is never seen in the young. It seldom happens to both eyes at once. It is attended by great swelling of the disc and adjacent parts of the retina, and by turgidity of the central vein, due, perhaps, to thrombotic phlebitis of that vessel. It is possible, however, that such is not its true pathology, and that the venous distension and stasis, perhaps in some instances thrombosis, are really secondary to the neuritis. If this be the fact, and neuro-retinitis be the primary condition, then we have in retinitis hæmorrhagica an instance in proof, that acquired or humoral gout may become the cause of neuritis. Among

24 cases, in 12, *i.e.*, exactly one-half, the patient had suffered definite attacks of gout, and, in five others, there was strong presumptive evidence of a gouty constitution. In seven there was no proof of gout. This last group comprises two in which diabetes was present; one in which albuminuria existed, and two in which the retinitis was not very well characterised as of the hæmorrhagic group. 13 of the patients were men, and 11 women. The youngest was 45. In 17 cases, only one eye was affected, and in seven both. In some cases, there were hæmorrhages only, with little, if any, evidence of neuro-retinitis.

*Summary.*—It is probable that there are many different forms of inflammation of the eye, or of parts of it, which are in connection with gout. They may be divided into two groups: (1) those which go with acquired, humoral or renal gout; (2) those which depend upon the inheritance of structures damaged, or at any rate specialised, by gout in predecessors. The difference between the two classes of affections is very marked. In the one, attacks of a transitory nature are the rule, and these attacks are often acute, and attended by much pain. In the second group, although a tendency to temporary recovery and recurrence is often observed, yet there is a great proneness to chronicity and persistence. The invasion is often insidious, but the disease is usually in the end destructive. In the former group may be placed hot eye, scleritis, recurrent iritis, and retinitis hæmorrhagica. All these are diseases of adult life. In the second group, we have insidious disorganising iritis, relapsing cyclitis, certain forms of soft cataract, and, perhaps, some of primary optic neuritis. Not only are there clearly marked clinical differences between the two classes of affections, but the difference in treatment is equally marked. In the first, the well-known measures against gout must be taken; a restricted regimen, alkalis, colchicum, and aconite, and liberal counter-irritation. In the second, we must use tonics; and although counter-irritants are here, also, often valuable, we cannot trust to any measure as really curative, short of complete change of climate.

*The Proofs of Gout.*—In the case of humoral or acquired gout, there ought to be the history of one or more definite attacks of joint-inflammation, usually of an acute character,



and attended by redness and œdema, and followed by peeling ; usually the great toe will have been the joint affected. Such patients will often state that they are very susceptible to the influence of beer and wine, and that malt liquor and some wines almost always cause indigestion, and make the urine muddy. If tophi be present in the ears or elsewhere, they are conclusive. In a few cases, we are justified in assuming the existence of humoral gout, although no paroxysm has ever occurred. If the dyspepsia be there, if the joints ache and prick after beer or wine, and if there be gout in relatives, we may confidently believe that it is present, although not yet declared. As regards the inherited form, we may take it as highly probable whenever parents or grandparents, or any one of them, are known to have suffered definitely. If even uncles, aunts, brothers or sisters, or cousins have suffered from true gout in early life, the belief that a family taint exists becomes very probable. The evidence must always be carefully sifted.

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